MITSUBISHI ELECTRIC

HEAT PUMP UNIT

December 2020

No. OCH722

REVISED EDITION-A

SERVICE MANUAL

R32

[Model Name]

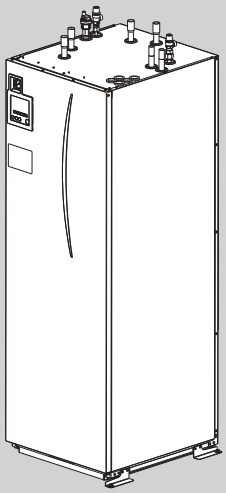
EHGT17D-YM9ED

Revision:
- DISASSEMBLY PROCEDURE has been modified in REVISED EDITION-A.

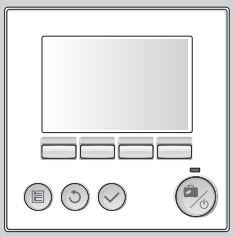
OCH722 is void.

[Service Ref.]

EHGT17D-YM9ED.UK



HEAT PUMP UNIT



MAIN REMOTE CONTROLLER

CONTENTS

PARTS CATALOG (OCB722)

1 SAFETY PRECAUTION

MEANINGS OF SYMBOLS DISPLAYED ON THE UNIT

	**WARNING** (Risk of fire)	This mark is for R32 refrigerant only. Refrigerant type is written on nameplate of heat pump unit. In case that refrigerant type is R32, this unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the OPERATION MANUAL carefully before operation.	
	Service personnel are required to carefully read the OPERATION MANUAL and INSTALLATION MANUAL before operation.	
	Further information is available in the OPERATION MANUAL, INSTALLATION MANUAL, and the like.	

1-1. ALWAYS OBSERVE FOR SAFETY

Before obtaining access to terminal, all supply circuits must be disconnected.

1-2. CAUTIONS RELATED TO NEW REFRIGERANT

Cautions for units utilizing refrigerant R32

Preparations before the repair service

- Prepare the proper tools.
- Prepare the proper protectors.
- Provide adequate ventilation.
- After stopping the operation of the heat pump unit, turn off the power-supply breaker.
- Discharge the condenser before the work involving the electric parts.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil, etc.

Use the following tools specifically designed for use with R32 refrigerant.

The following tools are necessary to use R32 refrigerant.

Tools for R32	
Gauge manifold	Flare tool
Charge hose	Size adjustment gauge
Gas leak detector	Vacuum pump adaptor
Torque wrench	Electronic refrigerant charging scale

Do not use refrigerant other than R32.

If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.

Preparations during the repair service

- Do not perform the work involving the electric parts with wet hands.
- Do not pour water into the electric parts.
- Do not touch the refrigerant.
- Do not touch the hot or cold areas in the refrigerating cycle.
- When the repair or the inspection of the circuit needs to be done without turning off the power, exercise great caution not to touch the live parts.

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

[1] Warning for service

(1) Do not alter the unit.
(2) For installation and relocation work, follow the instructions in the Installation Manual and use tools and pipe components specifically made for use with refrigerant specified in the installation manual.
(3) Ask a dealer or an authorized technician to install, relocate and repair the unit.
For appliances not accessible to the general public.
(4) Refrigerant pipes connection shall be accessible for maintenance purposes.
(5) If the heat pump unit is installed in a small room or closed room, measures must be taken to prevent the refrigerant concentration in the room from exceeding the safety limit in the event of refrigerant leakage. Should the refrigerant leak and cause the concentration limit to be exceeded, hazards due to lack of oxygen in the room may result.
(6) Keep gas-burning appliances, electric heaters, and other fire sources (ignition sources) away from the location where installation, repair, and other work will be performed.
If refrigerant comes into contact with a flame, poisonous gases will be released.
(7) When installing or relocating, or servicing the heat pump unit, use only the specified refrigerant (R32) to charge the refrigerant lines.
Do not mix it with any other refrigerant and do not allow air to remain in the lines.
If air is mixed with the refrigerant, then it can be the cause of abnormal high pressure in the refrigerant line, and may result in an explosion and other hazards.
(8) After installation has been completed, check for refrigerant leaks. If refrigerant leaks into the room and comes into contact with the flame of a heater or portable cooking range, poisonous gases will be released.
(9) Do not use low temperature solder alloy in case of brazing the refrigerant pipes.
(10) When performing brazing work, be sure to ventilate the room sufficiently or work outside. Make sure that there are no hazardous or flammable materials nearby.
When performing the work in a closed room, small room, or similar location, make sure that there are no refrigerant leaks before performing the work.
If refrigerant leaks and accumulates, it may ignite or poisonous gases may be released.
(11) Do not install the unit in places where refrigerant may build-up or places with poor ventilation such as a semi-basement: Refrigerant is heavier than air, and inclined to fall away from the leak source.
(12) The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
(13) Do not pierce or burn.
(14) Be aware that refrigerants may not contain an odour.
(15) Pipe-work shall be protected from physical damage.
(16) The installation of pipe-work shall be kept to a minimum.
(17) Compliance with national gas regulations shall be observed.
(18) Keep any required ventilation openings clear of obstruction.
(19) Servicing shall be performed only as recommended by the manufacturer.
(20) The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
(21) Maintenance, service and repair operations shall be performed by authorized technician with required qualification.
(22) Be sure to have appropriate ventilation in order to prevent ignition. Furthermore, be sure to carry out fire prevention measures that there are no dangerous or flammable objects in the surrounding area.

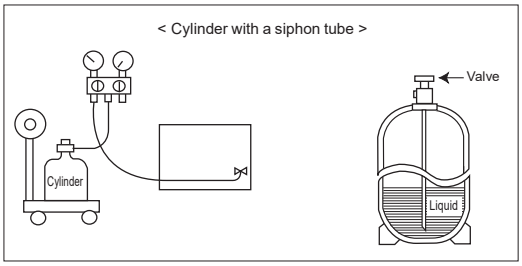
[2] Cautions for service

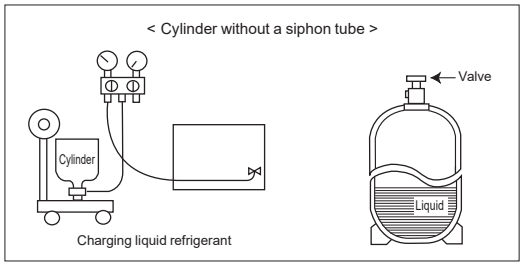
(1) Perform service after recovering the refrigerant left in unit completely.
(2) Do not release refrigerant in the air.
(3) After completing service, charge the cycle with specified amount of refrigerant.
(4) When performing service, install a filter drier simultaneously.
Be sure to use a filter drier for new refrigerant.

[3] Refrigerant charge

When charging directly from cylinder

R32 is a single refrigerant and its composition does not change. Therefore, both liquid charging and gas charging are possible. Liquid charging of refrigerant all at once from the low pressure side may cause the compressor malfunction. Accordingly, make sure that charging is gradual.





[4] Cautions for unit using R32 refrigerant

Pay careful attention to the following points.

(1) Information on servicing

(1-1) Checks on the Area

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized.

For repair to the refrigerating systems, (1-3) to (1-7) shall be completed prior to conducting work on the systems.

(1-2) Work Procedure

Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.

(1-3) General Work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

(1-4) Checking for Presence of Refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

(1-5) Presence of Fire Extinguisher

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.

Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

(1-6) No Ignition Sources

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

(1-7) Ventilated Area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

(1-8) Checks on the Refrigeration Equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.

The following checks shall be applied to installations using flammable refrigerants:

- The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
- The ventilation machinery and outlets are operating adequately and are not obstructed.
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
- Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being corroded.

(1-9) Checks on Electrical Devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include that:

- capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- no live electrical components and wiring are exposed while charging, recovering or purging the system;
- there is continuity of earth bonding

(2) Repairs to Sealed Components

(2-1) During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

(2-2) Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Ensure that the apparatus is mounted securely.

Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres.

Replacement parts shall be in accordance with the manufacturer’s specifications.

(3) Repair to intrinsically Safe Components
Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.
Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.
Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

(4) Cabling
Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or pumps.

(5) Detection of Flammable Refrigerants
Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

(6) Leak Detection Methods
Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)
Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.
Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
If a leak is suspected, all naked flames shall be removed/extinguished.
If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. For appliances containing flammable refrigerants, oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

(7) Removal and Evacuation
When breaking into the refrigerant circuit to make repairs – or for any other purpose conventional procedures shall be used. However, for flammable refrigerants it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:
- remove refrigerant
- purge the circuit with inert gas
- evacuate
- purge again with inert gas
- open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. For appliances containing flammable refrigerants, the system shall be “flushed” with OFN to render the unit safe. This process may need to be repeated several times.
Compressed air or oxygen shall not be used for purging refrigerant systems.
For appliances containing flammable refrigerants, flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place.
Ensure that the outlet for the vacuum pump is not close to any ignition sources and that ventilation is available.

(8) Charging Procedures
In addition to conventional charging procedures, the following requirements shall be followed:
- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept upright.
- Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigeration system.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

(9) Decommissioning
Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.
a) Become familiar with the equipment and its operation.

Continued to the next page

b) Isolate system electrically.
c) Before attempting the procedure, ensure that:
  • mechanical handling equipment is available, if required, for handling refrigerant cylinders;
  • all personal protective equipment is available and being used correctly;
  • the recovery process is supervised at all times by a competent person;
  • recovery equipment and cylinders conform to the appropriate standards.
d) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
e) Make sure that cylinder is situated on the scales before recovery takes place.
f) Start the recovery machine and operate in accordance with manufacturer's instructions.
g) Do not overfill cylinders. (No more than 80 % volume liquid charge).
h) Do not exceed the maximum working pressure of the cylinder, even temporarily.
i) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
j) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

(10) Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

(11) Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

[5] Service tools

Use the below service tools as exclusive tools for R32 refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	· Only for R32
		· Use the existing fitting specifications. (UNF1/2)
		· Use high-tension side pressure of 5.3MPa·G or over.
②	Charge hose	· Only for R32
		· Use pressure performance of 5.09MPa·G or over.
③	Electronic weighing scale	—
④	Gas leak detector	· Use the detector for R134a, R407C, R410a or R32.
⑤	Adaptor for reverse flow check	· Attach on vacuum pump.
⑥	Refrigerant charge base	—
⑦	Refrigerant cylinder	· Only for R32 · Cylinder with syphon
⑧	Refrigerant recovery equipment	—

1-3. PRECAUTIONS WHEN REUSING EXISTING R22/R410a REFRIGERANT TOOLS

Cautions for refrigerant piping work

Tools for R32 (The following table shows whether conventional tools can be used or not.)

Tools and materials	Use	R32 tools	Can R22 tools be used?	Can R407C tools be used?	Can R410a tools be used?
Gauge manifold	Air purge, refrigerant charge and operation check	Tool exclusive for R32	×	×	○
Charge hose		Tool exclusive for R32	×	×	○
Gas leak detector	Gas leak check	Tool for HFC refrigerant	×	○	○
Refrigerant recovery equipment	Refrigerant recovery	Tool exclusive for R32	×	×	○
Refrigerant cylinder	Refrigerant charge	Tool exclusive for R32	×	×	×
Safety charger	Prevent compressor malfunction when charging refrigerant by spraying liquid refrigerant	Tool exclusive for R32	×	×	○
Charge valve	Prevent gas from blowing out when detaching charge hose	Tool exclusive for R32	×	×	○
Vacuum pump	Vacuum drying and air purge	Tools for other refrigerants can be used if equipped with adapter for reverse flow check	△ (Usable if equipped with adapter for reverse flow)	△ (Usable if equipped with adapter for reverse flow)	△ (Usable if equipped with adapter for reverse flow)
Welder and nitrogen gas cylinder	Weld the pipes	Tools for other refrigerants can be used	○	○	○
Refrigerant charging scale	Refrigerant charge	Tools for other refrigerants can be used	○	○	○
Vacuum gauge or thermistor vacuum gauge and vacuum valve	Check the degree of vacuum. (Vacuum valve prevents back flow of oil and refrigerant to thermistor vacuum gauge)	Tools for other refrigerants can be used	○	○	○
Charging cylinder	Refrigerant charge	Tool exclusive for R32	×	–	×

× : Prepare a new tool. (Use the new tool as the tool exclusive for R32.)
△ : Tools for other refrigerants can be used under certain conditions.
○ : Tools for other refrigerants can be used.

2 SPECIFICATIONS

■ Product specification

Model name				EHGT17D-YM9ED
Nominal domestic hot water volume				170 L
Overall unit dimensions				1750 × 595 × 680 mm (Height × Width × Depth)
Weight (empty)				181 kg
Weight (full)				360 kg
Refrigerant				R32
The amount of refrigerant				0.9kg
Water volume of heating circuit in the unit *1				5.47 kg
Brine volume of brine circuit in the unit				3.11 kg
Safety device	Water circuit (Primary)	Control thermistor	Heating	1 to 80°C
		Pressure relief valve		0.3 MPa (3bar)
		Flow sensor		Min. flow 5.0 L/min
	Booster heater	Manual reset thermostat		90°C
		Thermal Cut-out (for dry run prevention)		121°C
	DHW tank	Control thermistor		40 to 70°C
		Temperature and pressure relief valve/ Pressure relief valve		1.0 MPa (10 bar)
	Brine circuit	Control thermistor		−8 to +30°C
		Flow switch		Min. flow 5.5 L/min
	Refrigerant circuit	Control thermistor (High)		−20 to +125°C
		Control thermistor (Low)		−40 to +90°C
		Pressure switch		4.14 ± 0.1 MPa
		Pressure sensor		0 to 5.0 MPa
Primary circuit circulating Pump				DC motor
Sanitary circuit circulating Pump				AC motor
Brine circuit circulating Pump				DC motor
Connections		Water		28 mm compression primary circuit/ 22 mm compression DHW circuit
		Brine		28 mm compression
Guaranteed operating range		Ambient *2		0 to 35°C (≦ 80 %RH)
		Brine inlet temperature		−8 to +30°C
		Min. Brine outlet temperature		−12°C
Operating range		Heating	Room temperature	10 to 30°C
			Flow temperature	20 to 60°C
		DHW		40 to 60°C
		Legionella prevention		60 to 70°C
Flow rate range		Primary circuit	Max.	27.7 L/min
			Min.	7.1 L/min
		Brine circuit	Max.	27.7 L/min
			Min.	7.1 L/min
DHW tank performance		Maximum allowable hot water temperature		70°C
Electrical data		Heat pump (exclude booster heater)	Power supply (Phase, voltage, frequency)	3N~, 400 V, 50 Hz
			Breaker	16 A
		Booster heater	Power supply (Phase, voltage, frequency)	3~, 400 V, 50 Hz
			Capacity	3 kW + 6 kW
			Current	13 A
			Breaker	16 A
Sound power level @B0W35 (EN12102)				42 dB(A)

<Table 2.1>

*1 Volume of sanitary water circuit is not included in this value
*2 The environment must be frost-free.

Optional extras

• Immersion heater (1Ph 1kW)	PAC-IH01V2-E
• Wireless Remote Controller	PAR-WT50R-E
• Wireless Receiver	PAR-WR51R-E
• Remote Sensor	PAC-SE41TS-E
• Thermistor	PAC-TH011-E
• High temperature thermistor	PAC-TH012HT-E
• ecodan Wi-Fi Interface	MAC-567IF-E1
• 2-zone kit	PAC-TZ02-E
• Expansion vessel(12L)	PAC-EVP12-E

3 PART NAMES AND FUNCTIONS

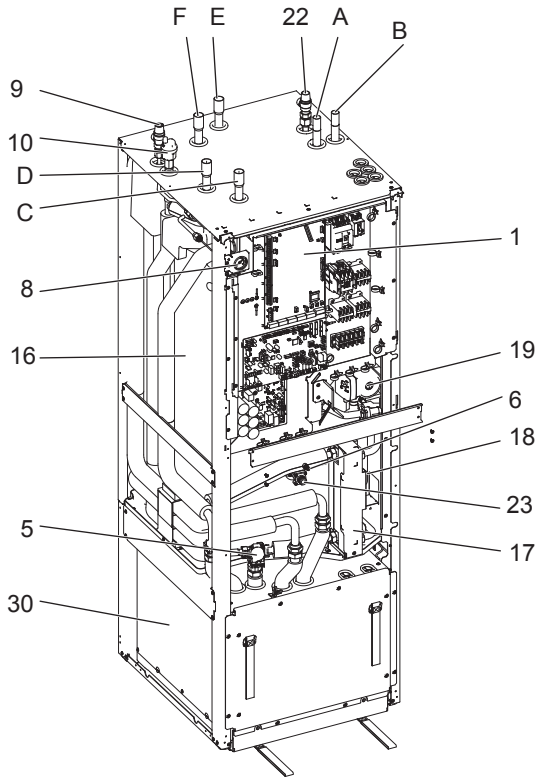
■ Component Parts

No.	Part name
A	DHW outlet pipe
B	Cold water inlet pipe
C	Water pipe (Space heating return connection)
D	Water pipe (Space heating flow connection)
E	Brine pipe (Bore hole return connection)
F	Brine pipe (Bore hole flow connection)
1	Control and electrical box
2	Main remote controller
3	Plate heat exchanger (Refrigerant - Water)
4	Booster heater 1,2
5	3-way valve
6	Manual air vent
7	Drain cock (Primary circuit)
8	Manometer
9	Pressure relief valve (3bar)
10	Automatic air vent
11	Expansion vessel (Optional parts)
12	Flow sensor
13	Strainer valve
14	Water circulation pump 1 (Primary circuit)
15	Pump valve
16	DHW tank
17	Plate heat exchanger (Water - Water)
18	Scale trap
19	Water circulation pump (Sanitary circuit)
20	Immersion heater (Optional parts)
21	Level vessel (Local supply)
22	Pressure relief valve (10bar) (DHW Tank)
23	Drain cock (DHW tank)
24	Pressure relief valve (3bar) (Local supply)
25	Flow water temp. thermistor (THW1)
26	Return water temp. thermistor (THW2)
27	DHW tank water temp. thermistor (THW5A)
28	DHW tank water temp. thermistor (THW5B)
29	Refrigerant liquid temp. thermistor (TH2)
30	Module
31	Drain pipe (Local supply)
32	Back flow prevention device (Local supply)
33	Isolating valve (Local supply)
34	Magnetic filter (Local supply) (Recommended)
35	Manometer (Local supply)
36	Compressor
37	High pressure switch/sensor
38	Linear expansion valve
39	Charge plug
40	Liquid temp. thermistor (TH3)
41	Discharge temp. thermistor (TH4)
42	Ambient temp. thermistor (TH7)
43	Heat sink temp. thermistor (TH8)
44	Plate heat exchanger (Brine - Refrigerant)
45	Drain cock (Brine circuit)
46	Brine circulation pump
47	Flow switch
48	Brine inlet temp. thermistor (TH32)
49	Brine outlet temp. thermistor (TH34)
50	Muffler

<Table 3.1>

Note:
For parts not shown above figure, please refer to 'Circuit diagram'.

<Overall>



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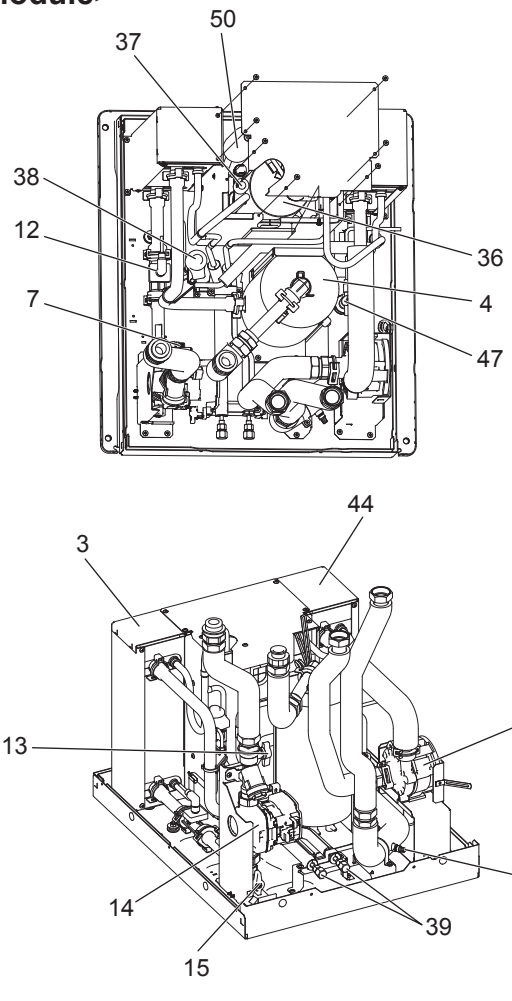
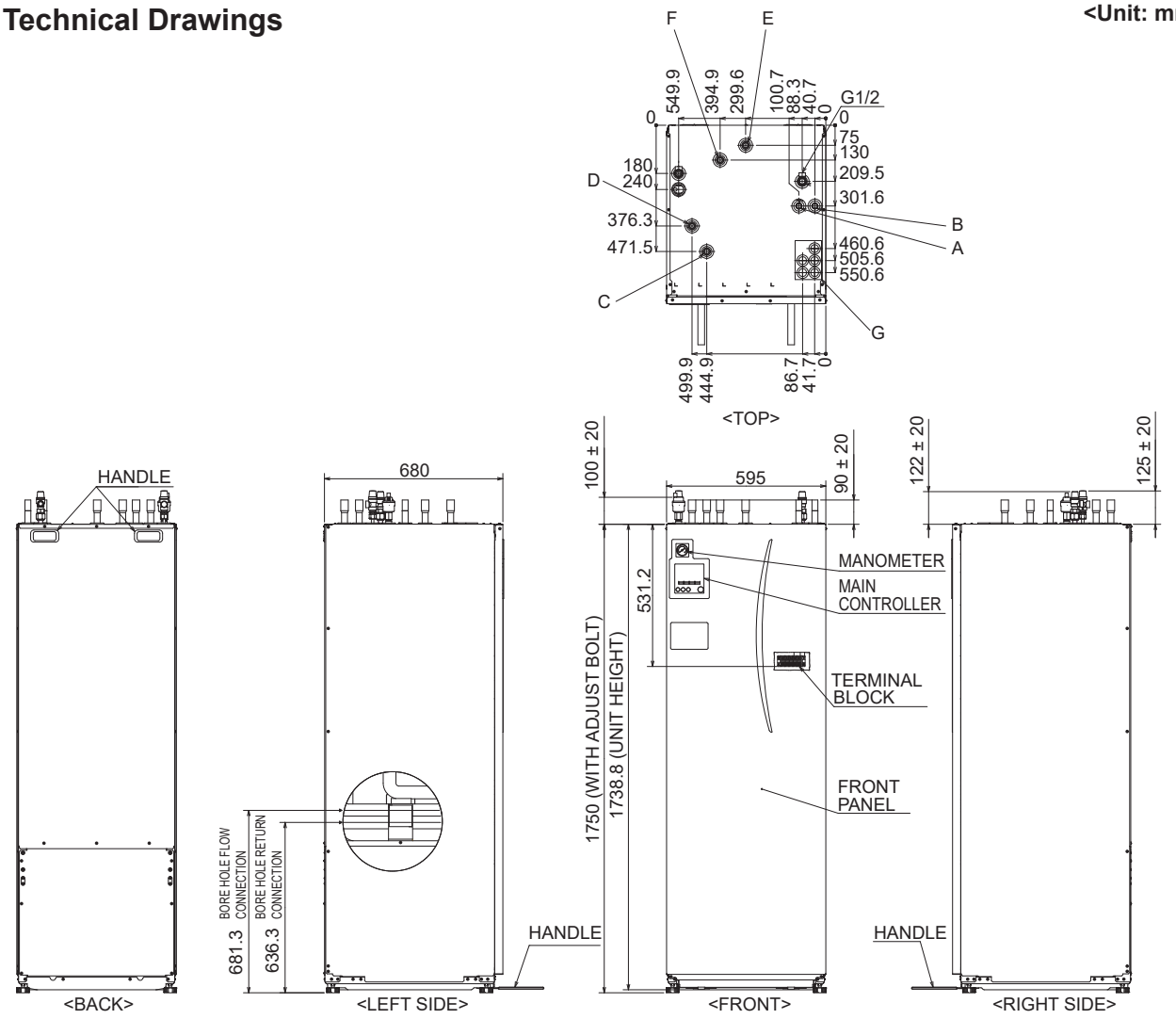


<Figure 3.1>

4 OUTLINES AND DIMENSIONS

4-1. Technical Drawings

<Unit: mm>

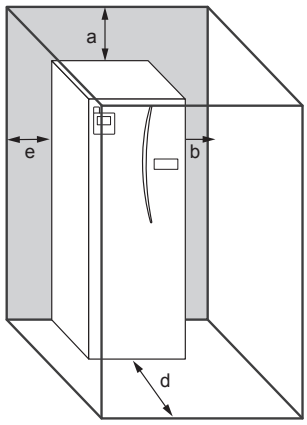


Letter	Pipe description	Connection size/type
A	DHW outlet connection	22 mm/Compression
B	Cold water inlet connection	22 mm/Compression
C	Space heating return connection	28 mm/Compression
D	Space heating flow connection	28 mm/Compression
E	Brine pipe (Bore hole return connection)	28 mm/Compression
F	Brine pipe (Bore hole flow connection)	28 mm/Compression
G	Electrical cable inlets ①②③④⑤	For inlets ① and ②, run low-voltage wires including external input wires and thermistor wires. For inlets ③, ④ and ⑤, run high-voltage wires including power cable, and external output wires. *For a wireless receiver (option) cable and ecodan Wi-Fi interface (option) cable, use inlet ①.

<Table 4.1.1>

4-2. Service access diagrams

Service access	
Parameter	Dimension (mm)
a	300
b	150
c (distance behind unit not visible in the right figure)	10
d	700*
e	150**



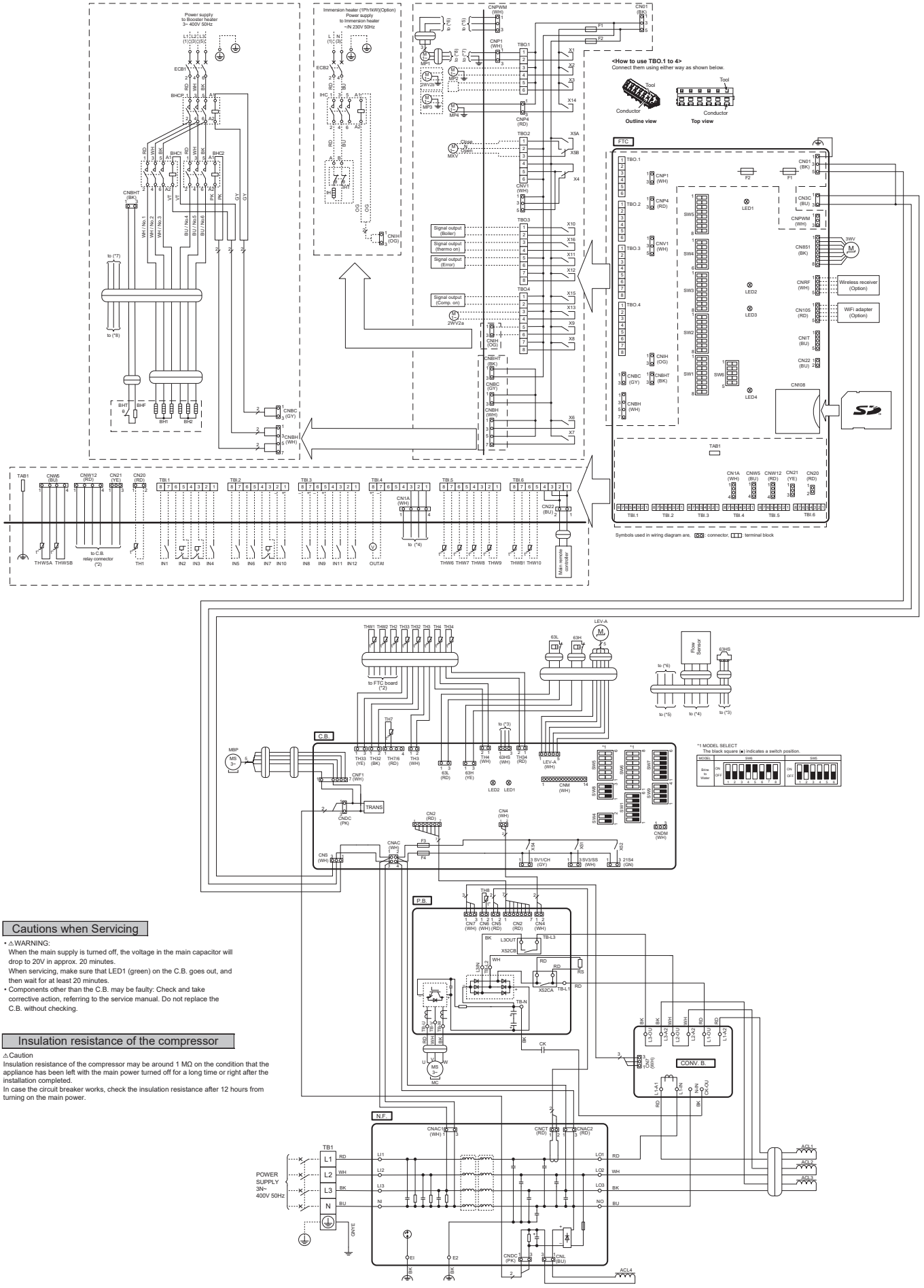
Service access

* Including Module removal space service
** An additional space is required, when brine pipe connecting to the side.

Sufficient space MUST be left for the provision of discharge pipework as detailed in National and Local Building Regulations.

The heat pump unit must be located indoors and in a frost-free environment, for example in a utility room, to minimise heat loss from stored water.

5 WIRING DIAGRAM



Cautions when Servicing

- ⚠WARNING:
  When the main supply is turned off, the voltage in the main capacitor will drop to 20V in approx. 20 minutes.
  When servicing, make sure that LED1 (green) on the C.B. goes out, and then wait for at least 20 minutes.
- Components other than the C.B. may be faulty: Check and take corrective action, referring to the service manual. Do not replace the C.B. without checking.

Insulation resistance of the compressor

⚠Caution
Insulation resistance of the compressor may be around 1 MΩ on the condition that the appliance has been left with the main power turned off for a long time or right after the installation completed.
In case the circuit breaker works, check the insulation resistance after 12 hours from turning on the main power.

Symbol	Name
TB1	Terminal block (Power supply)
ECB1	Earth leakage circuit breaker for booster heater
ECB2	Earth leakage circuit breaker for immersion heater (Option)
MP1	Water circulation pump 1 (Space heating & DHW)
MP2	Water circulation pump 2 (Space heating for Zone1)(Local supply)
MP3	Water circulation pump 3 (Space heating for Zone2)(Local supply)
MP4	Water circulation pump 4 (DHW)
3WV	3-way valve
2WV2a	2-way valve (For Zone 1)(Local supply)
2WV2b	2-way valve (For Zone 2)(Local supply)
MXV	Mixing valve (Local supply)
BHT	Thermostat for booster heater
BHF	Thermal fuse for booster heater
BH1	Booster heater 1
BH2	Booster heater 2
BHC1	Contactor for booster heater 1
BHC2	Contactor for booster heater 2
BHCP	Contactor for booster heater protection
IHT	Thermostat (fixed temp.) for immersion heater (Option)
IH	Immersion heater (Option)
IHC	Contactor for immersion heater (Option)
TH1	Thermistor (Room temp.)(Option)
TH2	Thermistor (Ref. liquid temp.)
THW1	Thermistor (Flow water temp.)
THW2	Thermistor (Return water temp.)
THW5A	Thermistor (DHW tank upper water temp.)
THW5B	Thermistor (DHW tank lower water temp.)
THW6	Thermistor (Zone1 flow water temp.)(Option)
THW7	Thermistor (Zone1 return water temp.)(Option)
THW8	Thermistor (Zone2 flow water temp.)(Option)
THW9	Thermistor (Zone2 return water temp.)(Option)
THW10	Thermistor (Mixing tank water temp.)(Option)
THWB1	Thermistor (Boiler flow water temp.)(Option)
IN1	Room thermostat 1 input (Local supply)
IN2	Flow switch 1 input (Local supply)
IN3	Flow switch 2 input (Zone1)(Local supply)
IN4	Demand control input (Local supply)
IN5	Outdoor thermostat input (Local supply)
IN6	Room thermostat 2 input (Local supply)
IN7	Flow switch 3 input (Zone2)(Local supply)
IN8	Electric energy meter 1 (Local supply)
IN9	Electric energy meter 2 (Local supply)
IN10	Heat meter (Local supply)
IN11	Smart grid ready input (Local supply)
IN12	
OUTA1	Analog output
FTC	FLOW TEMP. CONTROLLER
TBO.1-4	Terminal block (Outputs)
TBI.1-6	Terminal block (Signal inputs, Thermistor inputs, Output)
F1	Fuse (IEC T10AL250V)
F2	Fuse (IEC T6.3AL250V)
SW1-6	DIP switch *See Table 3
X1- 16	Relay
LED1	Power supply (FTC)
LED2	Power supply (Main remote controller)
LED3	Communication (FTC-C.B.)
LED4	Reading or writing data to SD card
CNPWM	Pump speed control signal for MP1
CN108	SD card connector

Symbol	Name
MC	Motor for Compressor
MBP	Brine Pump Motor
63H	High Pressure Switch
63L	Flow Switch
63HS	High Pressure Sensor
TH3	Thermistor (Liquid)
TH4	Thermistor (Discharge)
TH7	Thermistor (Outdoor)
TH8	Thermistor (Heat Sink)
TH32	Thermistor (Brine Inlet)
TH33	Thermistor (Comp. Surface)
TH34	Thermistor (Brine Outlet)
LEV-A	Linear Expansion Valve
ACL1,ACL2,ACL3,ACL4	Reactor
CK	Capacitor
RS	Rush Current Protect Resistor
P.B.	Power Circuit Board
N.F.	Noise Filter Circuit Board
CONV.B.	Converter Circuit Board
C.B.	Controller Circuit Board
SW1	Switch (Function Switch)
SW4	Switch (Function Switch)
SW5	Switch (Function Switch)
SW6	Switch (Model Select, Function Switch)
SW7	Switch (Function Switch)
SW8	Switch (Function Switch)
SW9	Switch (Function Switch)
CNDM	Connector (Connection for Option)
SV1/CH	Connector
SV3/SS	Connector
21S4	Connector
LED1,LED2	LED (Operation Inspection Indicators)
F3, F4	Fuse (T6.3AL250V)
X51,X52,X54	Relay

Table 1 Signal inputs

Name	Terminal block	Connector	Item	OFF (Open)	ON (Short)
IN1	TBI.1 7-8	—	Room thermostat 1 input *9	Refer to SW2-1 in <Table 9.8.1 DIP Switch Functions>.	
IN2	TBI.1 5-6	—	Flow switch 1 input	Refer to SW2-2 in <Table 9.8.1 DIP Switch Functions>.	
IN3	TBI.1 3-4	—	Flow switch 2 input (Zone1)	Refer to SW3-2 in <Table 9.8.1 DIP Switch Functions>.	
IN4	TBI.1 1-2	—	Demand control input	Normal	Heat source OFF/ Boiler operation *11
IN5	TBI.2 7-8	—	Outdoor thermo-stat input *10	Standard opera-tion	Heater operation/ Boiler operation *11
IN6	TBI.2 5-6	—	Room thermostat 2 input *9	Refer to SW3-1 in <Table 9.8.1 DIP Switch Functions>.	
IN7	TBI.2 3-4	—	Flow switch 3 input (Zone2)	Refer to SW3-2 in <Table 9.8.1 DIP Switch Functions>.	
IN8	TBI.3 7-8	—	Electric energy meter 1	Refer to installation manual.	
IN9	TBI.3 5-6	—	Electric energy meter 2		
IN10	TBI.2 1-2	—	Heat meter		
IN11	TBI.3 3-4	—	Smart grid ready input		
IN12	TBI.3 1-2	—			
INA1	TBI.4 1-3	CN1A	Flow sensor	—	—

*9. Set the ON/OFF cycle time of the room thermostat for 10 minutes or more; otherwise the compressor may be damaged.

*10.If using outdoor thermostat for controlling operation of heaters, the lifetime of the heaters and related parts may be reduced.

*11.To turn on the boiler operation, use the main remote controller to select "Boiler" in "External input setting" screen in the service menu.

Table 2 Outputs

Name	Terminal block	Connector	Item	OFF	ON
OUT1	TBO.1 1-2	CNP1	Water circulation pump 1 output (Space heating & DHW)	OFF	ON
OUT2	TBO.1 3-4	—	Water circulation pump 2 output (Space heating for Zone1)	OFF	ON
OUT3	TBO.1 5-6	—	Water circulation pump 3 output (Space heating for Zone2) *12	OFF	ON
			2-way valve 2b output *13		
OUT4	—	CN851	3-way valve output	Heating	DHW
OUT5	TBO.2 1-2	—	Mixing valve output *12	Stop	Close
	TBO.2 2-3				Open
OUT6	—	CNBH 1-3	Booster heater 1 output	OFF	ON
OUT7	—	CNBH 5-7	Booster heater 2 output	OFF	ON
OUT8	TBO.4 7-8	—	—	—	—
OUT9	TBO.4 5-6	CNIH	Immersion heater output	OFF	ON
OUT10	TBO.3 1-2	—	Boiler output	OFF	ON
OUT11	TBO.3 5-6	—	Error output	Normal	Error
OUT12	TBO.3 7-8	—	—	—	—
OUT13	TBO.4 3-4	—	2-way valve 2a output *13	OFF	ON
OUT14	—	CNP4	Water circulation pump 4 output (DHW)	OFF	ON
OUT15	TBO.4 1-2	—	Comp. ON signal	OFF	ON
OUT16	TBO.3 3-4	—	Heaing thermo ON signal	OFF	ON
OUTA1	TBI.4 7-8	—	Analog output	—	—

Do not connect to the terminals that are indicated as "—" in the "Terminal block" field.

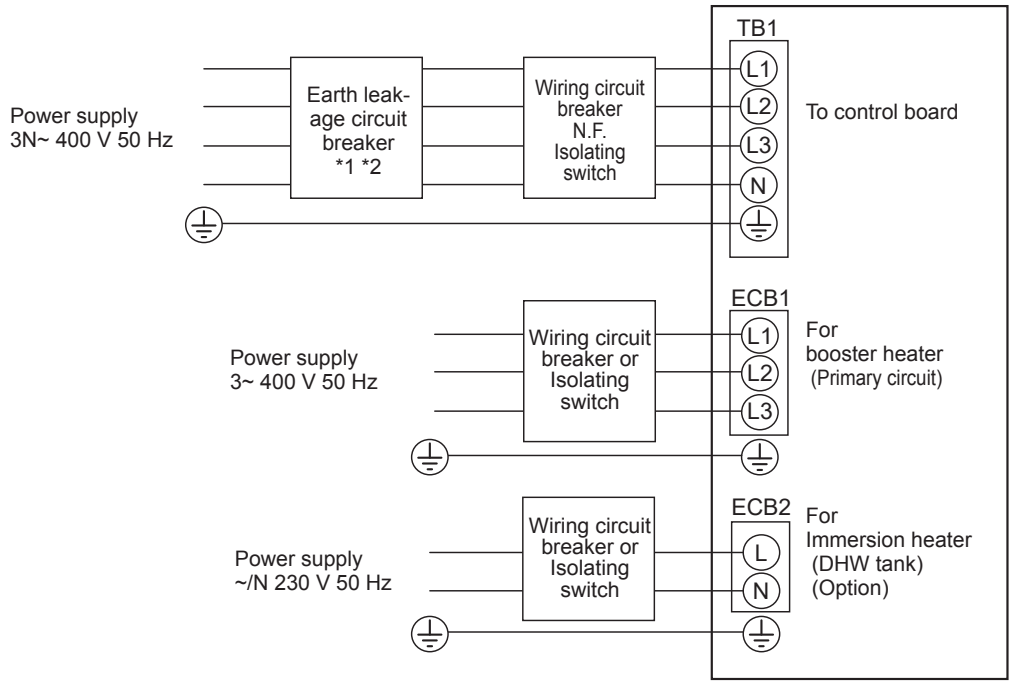
*12. For 2-zone temperature control.

*13. For 2-zone valve ON/OFF control.

6 FIELD WIRING

Breaker abbreviation	Meaning
ECB1	Earth leakage circuit breaker for booster heater
ECB2	Earth leakage circuit breaker for immersion heater (option)
TB1	Terminal block 1

Affix label A that is included with the manuals near each wiring diagram for heat pump units.



<Figure 6.1>
Electrical connections 3 phase

Description	Power supply	Capacity	Breaker	Wiring
Booster heater (Primary circuit)	3~ 400 V 50 Hz	9 kW	16 A *2	2.5 mm²
Immersion heater (DHW tank) (Option)	~/N 230 V 50 Hz	1 kW	16 A *2	2.5 mm²

Ground source unit power supply			3N~ 400 V 50 Hz
Ground source unit circuit breaker capacity		*3	16 A
Wiring No. × size (mm²)	Ground source unit power supply, earth		5 × Min. 1.5
Circuit rating	Ground source unit L1-N, L2-N, L3-N	*4	230 V AC

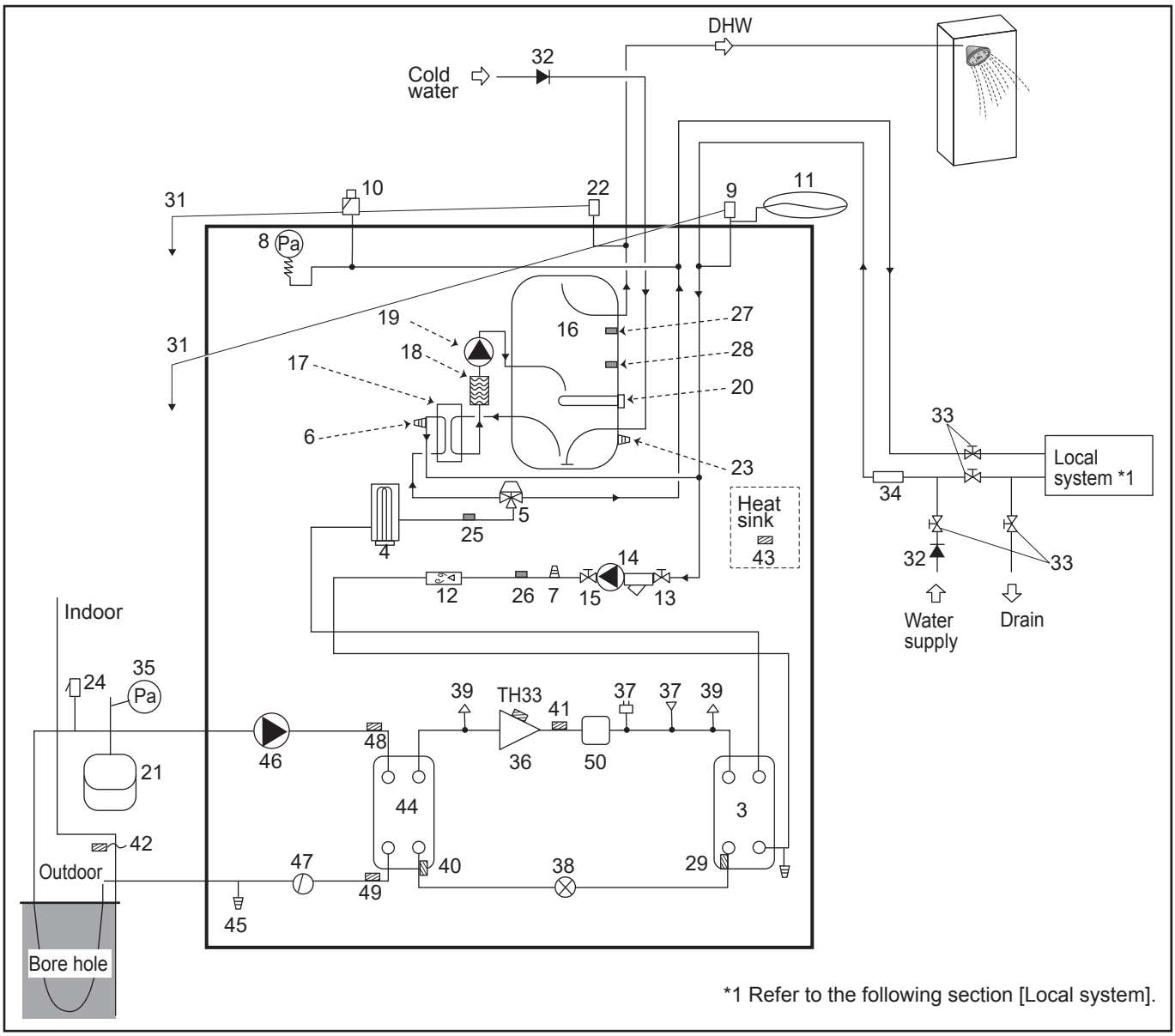
*1. If the installed earth leakage circuit breaker does not have an over-current protection function, install a breaker with that function along the same power line.
*2. A breaker with at least 3.0 mm contact separation in each pole shall be provided.Use earth leakage breaker (NV).
The breaker shall be provided to ensure disconnection of all active phase conductors of the supply.
*3. Use wires in conformity with design 60245 IEC 57.
*4. The values given in the table above are not always measured against the ground value.

Note: **1. Wiring size must comply with the applicable local and national codes.**
2. Install an earth line longer than power cables
3. Please keep enough output capacity of power supply for each heater. Insufficient power supply capacity might cause chattering.

7 WATER SYSTEM DIAGRAM

Circuit diagram

• Refer to <Table 3.1> for the part names.



<Figure 7.1>

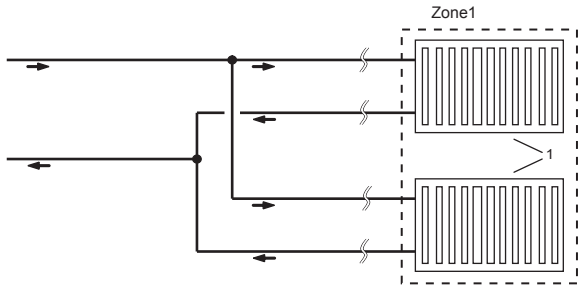
Note
- To enable draining of the heat pump unit an isolating valve should be positioned on both the inlet and outlet pipework.
- Be sure to install a strainer on the inlet pipework to the heat pump unit.
- Suitable drain pipework should be attached to all relief valves in accordance with your country's regulations.
- A backflow prevention device must be installed on the cold water supply pipework (IEC 61770)
- When using components made from different metals or connecting pipes made of different metals insulate the joints to prevent any corrosive reaction taking place which may damage the pipework.

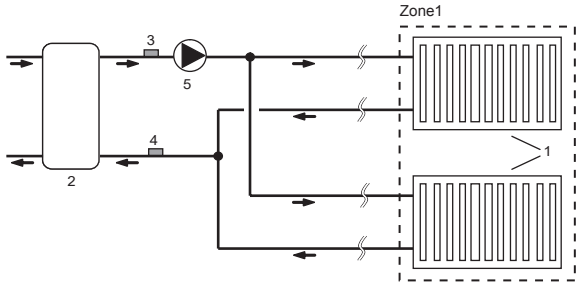
Model name	EHGT17D-YM9ED
Maximum supply pressure to the pressure reducing valve	16 bar
Operating pressure (Potable side)	3.5 bar
Expansion vessel charge setting pressure (Potable side)	3.5 bar
Expansion valve setting pressure (Potable side)	6.0 bar
Immersion heater specification (Potable side) *	1000 W, 230 V
DHW tank capacity	170 L
Mass of the unit when full	360 kg
Maximum primary working pressure	2.5 bar

* EN60335/Type 1000W single phase 230V 50Hz, length 460 mm.
Use only Mitsubishi Electric service parts as a direct replacement.

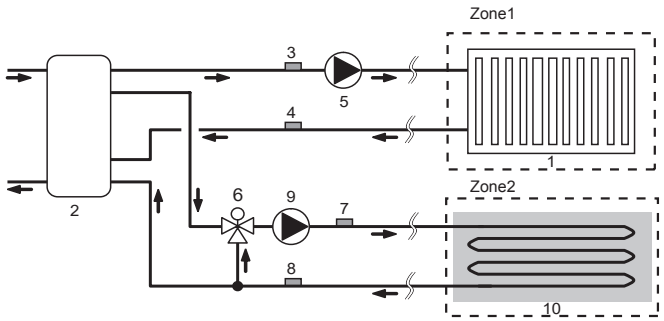
Local system

1-zone temperature control

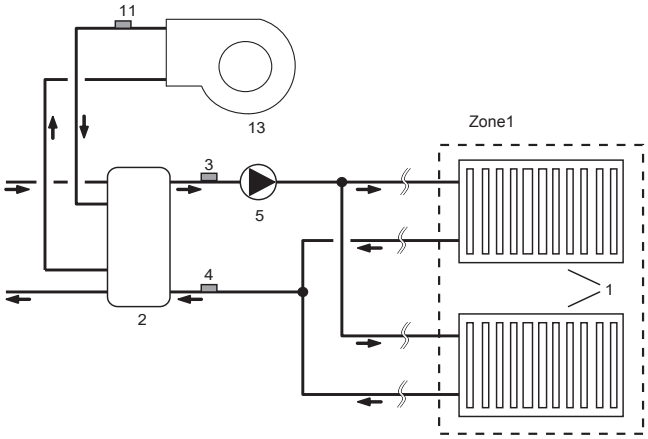




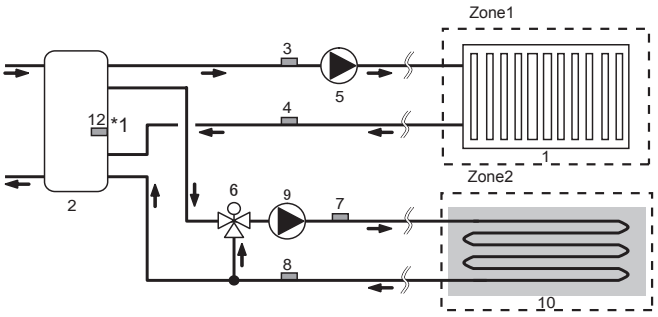
2-zone temperature control



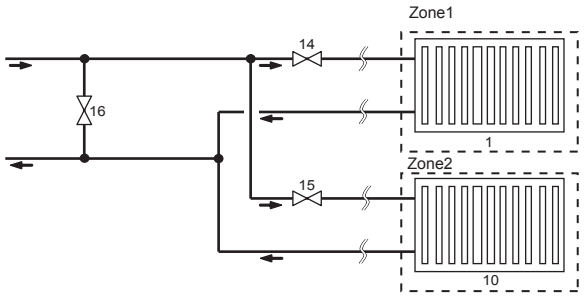
1-zone temperature control with boiler



2-zone temperature control & Buffer tank control



1-zone temperature control (2-zone valve ON/OFF control)



1. Zone1 heat emitters (e.g. radiator, fan coil unit) (local supply)
2. Mixing tank (local supply)
3. Zone1 flow water temp. thermistor (THW6) } Optional part : PAC-TH011-E
4. Zone1 return water temp. thermistor (THW7) } Optional part : PAC-TH011-E
5. Zone1 water circulation pump (local supply)
6. Motorized mixing valve (local supply)
7. Zone2 flow water temp. thermistor (THW8) } Optional part : PAC-TH011-E
8. Zone2 return water temp. thermistor (THW9) } Optional part : PAC-TH011-E
9. Zone2 water circulation pump (local supply)
10. Zone2 heat emitters (e.g. underfloor heating) (local supply)
11. Boiler flow water temp. thermistor (THWB1) } Optional part : PAC-TH012HT(L)-E
12. Mixing tank thermistor (THW10) *1 } Optional part : PAC-TH012HT(L)-E
13. Boiler (local supply)
14. Zone1 2-way valve (local supply)
15. Zone2 2-way valve (local supply)
16. Bypass valve (local supply)

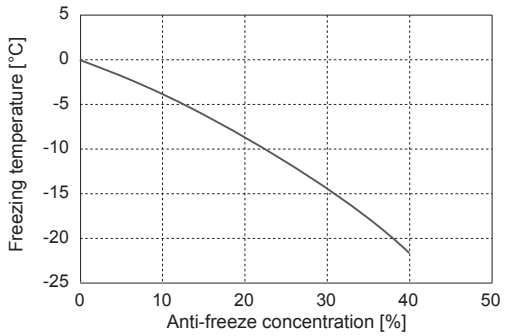
*1 ONLY Buffer tank control (heating/cooling) applies to "Smart grid ready".

Filling the System (Primary Circuit)

1. Check and charge expansion vessel.
2. Check all connections including factory fitted ones are tight.
3. Insulate pipework.
4. Thoroughly clean and flush, system of all debris.
5. Fill heat pump unit with potable water. Fill primary heating circuit with water and suitable anti-freeze and inhibitor as necessary. Always use a filling loop with double check valve when filling the primary circuit to avoid back flow contamination of water supply.

When connecting metal pipes of different materials insulate the joints to prevent a corrosive reaction taking place which will damage the pipework.

6. Check for leakages. If leakage is found, retighten the nut onto the connections. Please make sure to prevent electrical part against water at draining.
7. Pressurise system to 1 bar.
8. Release all trapped air using air vents during and following heating period.
9. Top up with water as necessary. (If pressure is below 1 bar)



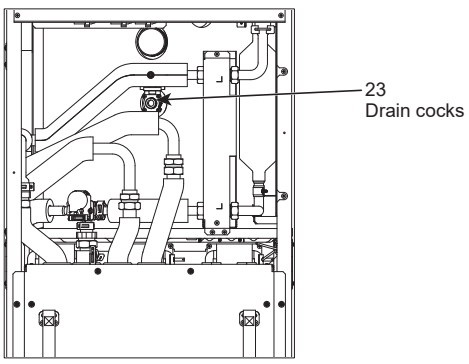
Pre-commissioning exercises- potable/DHW circuit

Initial fill procedure:
Ensure all pipe joints and fittings are tight and secure.
Open the most distant DHW tap/outlet.
Slowly/gradually open the mains water supply to begin filling unit and DHW pipework.
Allow most distant tap to run free and release/purge residual air from installation.
Close tap/outlet to retain fully charged system.
Note: When an immersion heater is fitted, do NOT energise the heater until the DHW tank is full of water. Also do NOT energise any immersion heater if any sterilisation chemicals remain in the DHW tank as this will cause premature failure of the heater.

Initial flush procedure:
Energise system to heat-up heat pump unit contents to a temperature of approx. 30 - 40°C.
Flush/drain the water contents to remove any residue/impurities resulting from the installation works. Use the heat pump unit drain cock to safely discharge the warmed water to drain via a suitable hose.
On completion, close drain cock, re-fill system and resume system commissioning.

<Draining the heat pump unit and its primary heating circuit (local)>
WARNING: DRAINED WATER MAY BE VERY HOT

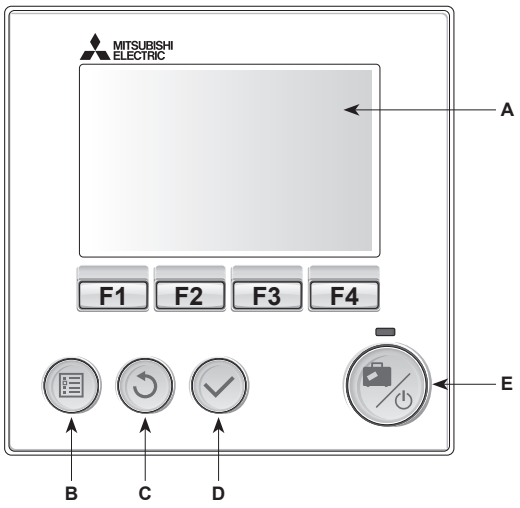
1. Before attempting to drain the heat pump unit isolate from the electrical supply to prevent the immersion and booster heaters burning out.
2. Isolate cold water feed to DHW tank.
3. Open a hot water tap to start draining without a vacuum.
4. Attach a hose to the DHW tank drain cocks (No. 23 on Figure 3.1 and Figure 7.2). The hose should be able to withstand heat as the draining water could be very hot. The hose should drain to a place lower than the DHW tank bottom to encourage siphoning.
5. When the DHW tank is drained close drain cock and hot tap.
6. Attach hose to water circuit drain cocks (No. 7 on Figure 3.1). The hose should be able to withstand heat as the draining water could be very hot. The hose should drain to a place lower than the booster heater drain cock to encourage siphoning. Open the pump valves and the strainer valves.
7. Water remains in the strainer still after the heat pump unit was drained.
   Drain the strainer by removing the strainer cover.

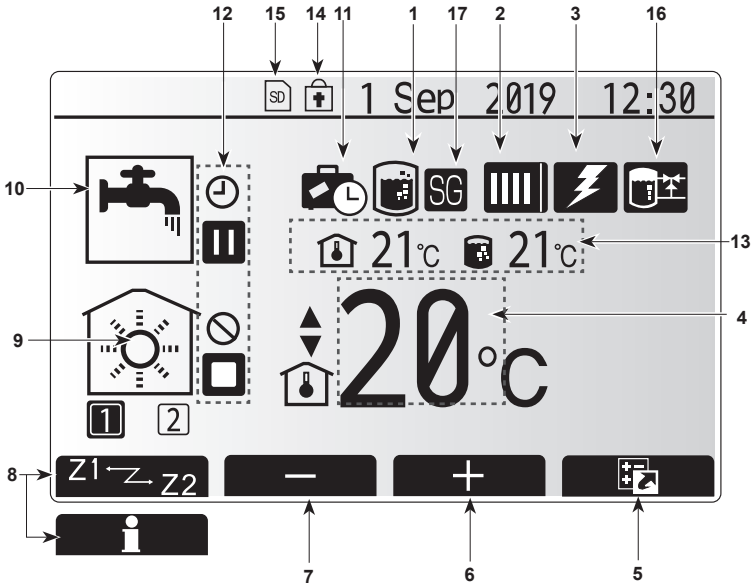


<Figure 7.2>

8 CONTROLS

8-1. Main remote controller





Main screen

<Main remote controller parts>

Letter	Name	Function
A	Screen	Screen in which all information is displayed
B	Menu	Access to system settings for initial set up and modifications.
C	Back	Return to previous menu.
D	Confirm	Used to select or save. (Enter key)
E	Power/Holiday	If system is switched off pressing once will turn system on. Pressing again when system is switched on will enable Holiday Mode. Holding the button down for 3 seconds will turn the system off. (***1**)
F1-4	Function keys	Used to scroll through menu and adjust settings. Function is determined by the menu screen visible on screen A.

***1**
When the system is switched off or the power supply is disconnected, the heat pump unit protection functions (e.g. freeze stat function) will NOT operate. Please beware that without these safety functions enabled the heat pump unit may potentially become exposed to damage.

<Main screen icons>

	Icon	Description	
1	Legionella prevention	When this icon is displayed 'Legionella prevention mode' is active.	
2	Heat pump		'Heat pump' is running.
			Emergency heating
			'Quiet mode' is activated.
3	Electric heater	When this icon is displayed the 'Electric heaters' (booster or immersion heater) are in use.	
4	Target temperature		Target flow temperature
			Target room temperature
			Compensation curve
5	OPTION	Pressing the function button below this icon will display the option screen.	
6	+	Increase desired temperature.	
7	-	Decrease desired temperature.	
8	Z1 Z2	Pressing the function button below this icon switches between Zone1 and Zone2.	
	Information	Pressing the function button below this icon displays the information screen.	
9	Space heating mode		Heating mode Zone1 or Zone2
10	DHW mode	Normal or ECO mode	
11	Holiday mode	When this icon is displayed 'Holiday mode' activated.	
12		Timer	
		Prohibited	
		Server control	
		Stand-by	
		Stop	
		Operating	
13	Current temperature		Current room temperature
			Current water temperature of DHW tank
14		The Menu button is locked or the switching of the operation modes between DHW and Heating operations are disabled in the Option screen.(***3**)	
15		SD memory card is inserted. Normal operation.	
		SD memory card is inserted. Abnormal operation.	
16	Buffer tank control	When this icon is displayed, 'Buffer tank control' is active.	
17	Smart grid ready	When this icon is displayed, 'Smart grid ready' is active.	

***2 This unit is in Stand-by whilst other indoor unit(s) is in operation by priority.**
***3 To lock or unlock the Menu, press the BACK and CONFIRM keys simultaneously for 3 seconds.**

8-2. Setting the Main remote controller

After the power has been connected to the heat pump units (See "6. FIELD WIRING") the initial system settings can be entered via the main remote controller.

1. Check all breakers and other safety devices are correctly installed and turn on power to the system.
2. When the main remote controller is switched on for the first time, the screen automatically goes to Initial settings menu, Language setting screen and Date/Time setting screen in order.
3. Main remote controller will automatically start up. Wait approximately 6 minutes whilst the control menus load.
4. When the controller is ready a blank screen with a line running across the top will be displayed.
5. Press button E (Power) (refer to page 41) to turn on the system. Before turning on the system, perform initial settings as instructed below.

8-3. Initial settings wizard

When the main remote controller is switched on for the first time, the screen automatically goes to Language setting screen, Date/Time setting screen and Main settings menu screen in order. Enter the desired number using the function keys and press CONFIRM.

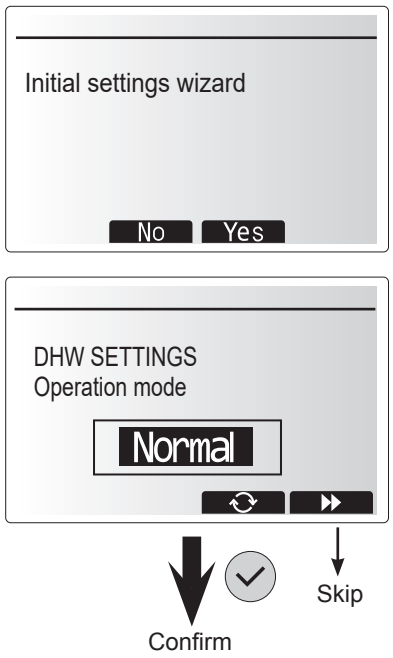
Note:

<HEATER CAPACITY RESTRICTION>

This setting restricts the booster heater capacity. It is NOT possible to change the setting after starting up.

If you do not have any special requirements (such as building regulations) in your country, skip this setting (select "No").

- Hot water (DHW/Legionella)
- Heating
- Operation mode (ON/Prohibited/Timer)
- Pump speed
- Heat pump flow rate range
- Mixing valve control
- HEATER CAPACITY RESTRICTION



8-4. Main Settings Menu

The main settings menu can be accessed by pressing the MENU button. To reduce the risk of untrained end users altering the settings accidentally there are 2 access levels to the main settings; and the service section menu is password protected.

User Level – Short press

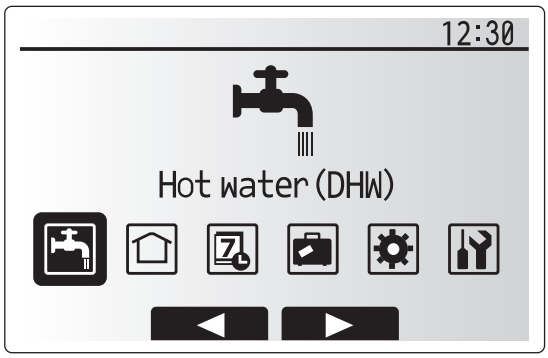
If the MENU button is pressed once for a short time, the main settings will be displayed but without the edit function. This will enable the user to view current settings but **NOT** change the parameters.

Installer Level – Long press

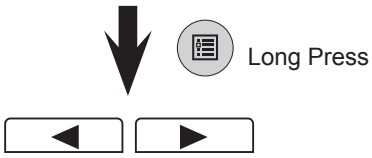
If the MENU button is pressed down for 3 seconds, the main settings will be displayed with all functionality available.
The color of ◄► buttons is inverted as per right figure.

The following items can be viewed and/or edited (dependent on access level).

- Domestic Hot water (DHW)
- Heating
- Schedule timer
- Holiday mode
- Initial settings
- Service (Password protected)



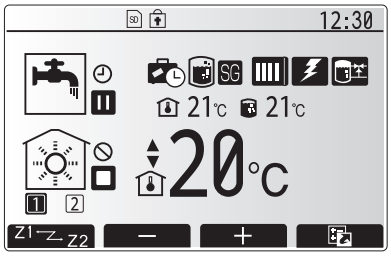
Main menu



General Operation

In general operation the screen displayed on the main remote controller will be shown as in the figure on the right.
This screen shows the target temperature, space heating mode, DHW mode, any additional heat sources being used, holiday mode, and the date and time.

You should use the function buttons to access more information. When this screen is displayed pressing F1 will display the current status and pressing F4 will take the user to the option menu screen.



Home screen

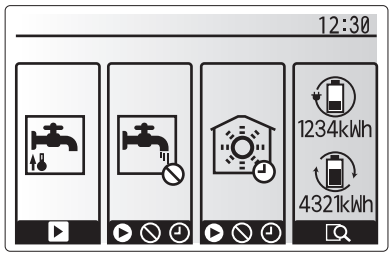
<Option screen>

This screen shows the main operating modes of the system.
Use function buttons to switch between Operating (►), Prohibited (⃠) and Timer (🕘) for DHW and space heating, or detailed information on energy or capacity.

The option screen allows quick setting of the following;

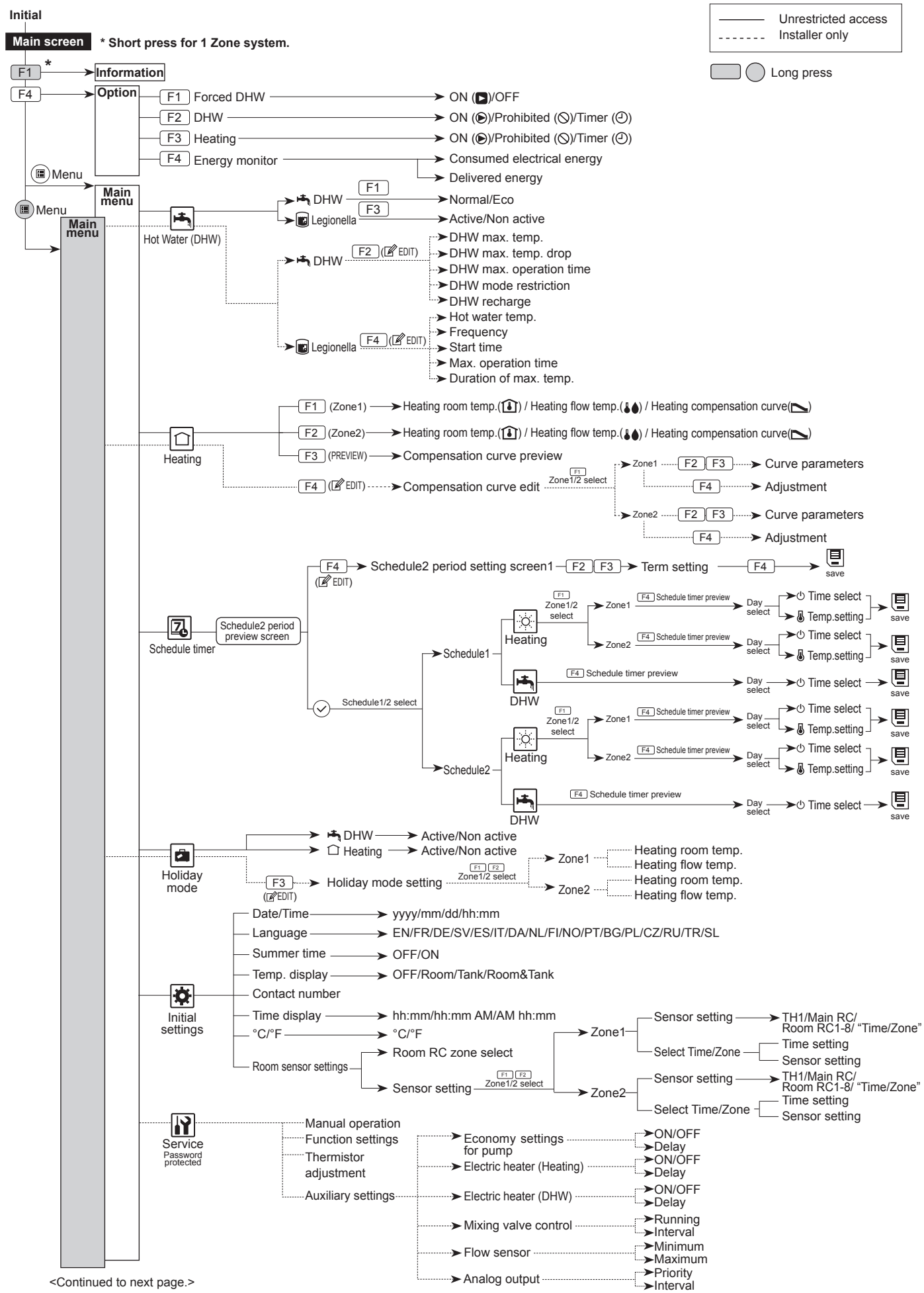
- Forced DHW — to turn ON/OFF press F1
- DHW operating mode — to change mode press F2
- Space heating operating mode — to change mode press F3
- Energy monitor
  Following accumulated energy values are displayed.
  : Consumed electrical energy in total (month-to-date)
  : Delivered heat energy in total (month-to-date)
  To monitor the energy values in each operation mode for [month-to-date/ last month/ the month before last/ year-to-date/ last year], press F4 to access to the Energy monitor menu.

Note:
If a certain accuracy is required for the monitoring, the method to display captured data from external energy meter(s) should be set up. Contact your installer for further details.



Option screen

<Main Remote Controller Menu Tree>



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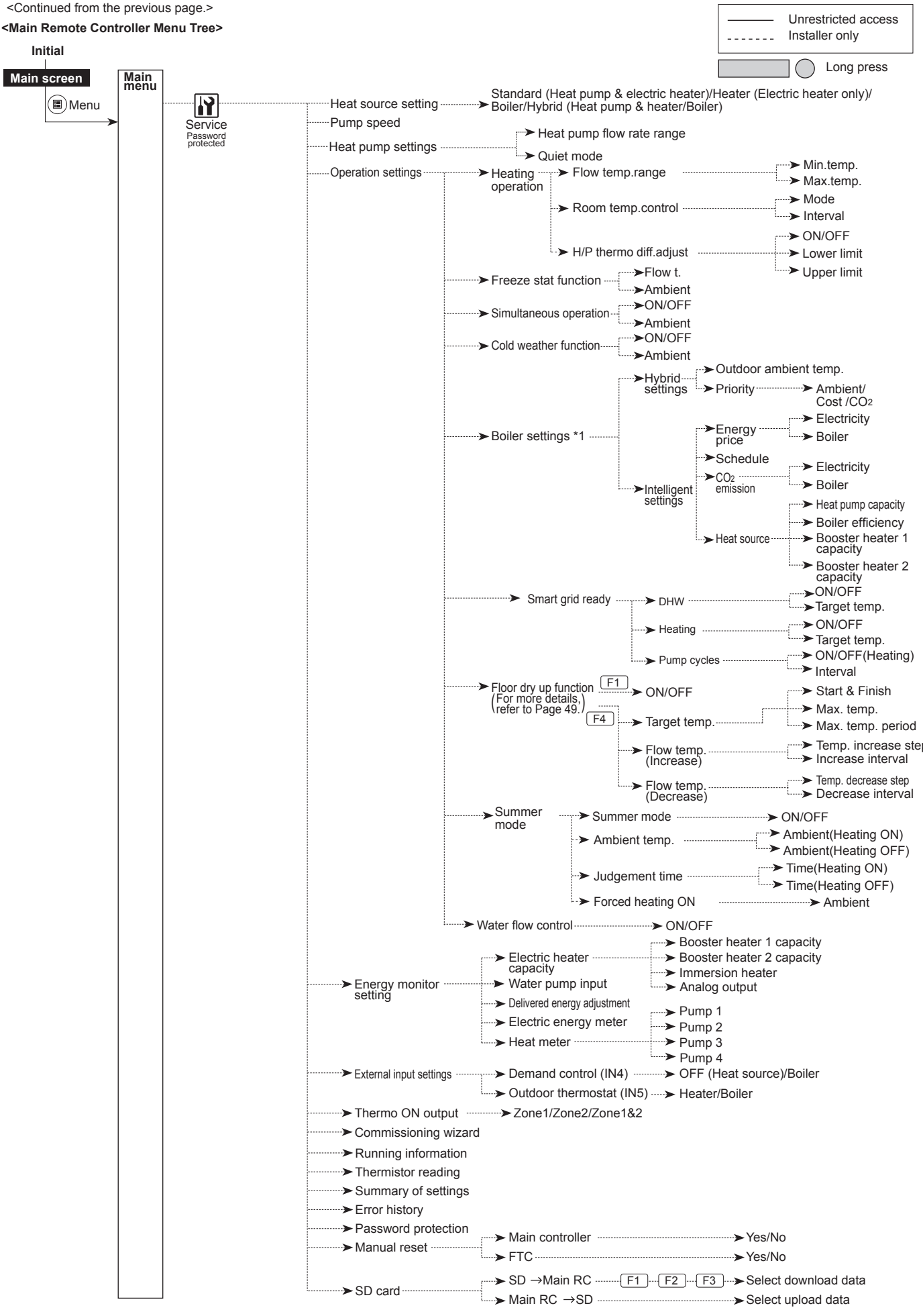
<Main Remote Controller Menu Tree>



*1 For more details, refer to the installation manual of PAC-TH012HT-E.

8-5. Service Menu

The service menu provides functions for use by installer or service engineer. It is NOT intended the home owner alters settings within this menu. It is for this reason password protection is required to prevent unauthorised access to the service settings.

The factory default password is "0000".
Follow the procedure described in General Operation for the set up operation.

The service menu is navigated using the F1 and F2 buttons to scroll through the functions. The menu is split across 2 screens and is comprised of the following functions;

1. Manual operation
2. Function settings
3. Thermistor adjustment
4. Auxiliary settings
5. Heat source setting
6. Pump speed
7. Heat pump settings
8. Operation settings
9. Energy monitor settings
10. External input settings
11. Thermo ON output
12. Commissioning wizard
13. Running information
14. Thermistor reading
15. Summary of settings
16. Error history
17. Password protection
18. Manual reset
19. SD card

In this Installation Manual, instructions will be given only for the following functions;

1. Manual operation
2. Auxiliary settings
3. Heat source setting
4. Operation settings
5. Energy monitor settings
6. External input settings
7. Password protection
8. Manual reset

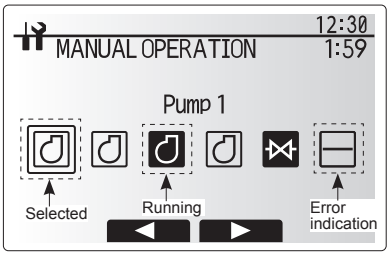
Information on the other functions can be found by consulting the service manual.

Many functions cannot be set whilst the heat pump unit is running. The installer should turn off the unit before trying to set these functions. If the installer attempts to change the settings whilst the unit is running the main remote controller will display a reminder message prompting the installer to stop operation before continuing. By selecting “Yes” the unit will cease operation.

<Manual operation>

During the filling of the system the water circulation pump and 3-way valve can be manually overridden using manual operation mode.
When manual operation is selected a small timer icon appears in the screen. The function selected will only remain in manual operation for a maximum of 2 hours. This is to prevent accidental permanent override of the FTC.

►Example
Pressing F3 button will switch manual operation mode ON for the main 3-way valve. When filling of the DHW tank is complete the installer should access this menu again and press F3 to deactivate manual operation of the part. Alternatively after 2 hours manual operation mode will no longer be active and FTC will resume control of the part.



Manual operation menu screen

Manual operation and heat source setting cannot be selected if the system is running. A screen will be displayed asking the installer to stop the system before these modes can be activated. The system automatically stops 2 hours after the last operation.

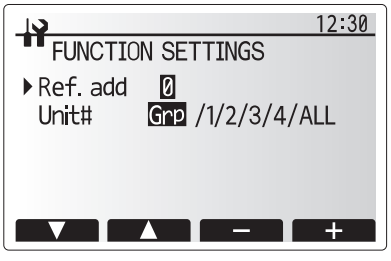
<Function settings>

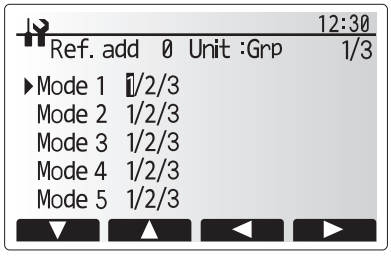
Function Setting allows the setting of auto recovery after power failure.

1. From the service menu use F1 and F2 to highlight Function Setting.
2. Press CONFIRM.
3. Ensure the Ref address and unit number are displayed to the right.
4. Press CONFIRM.
5. Use F3 and F4 to highlight either 1/2/3 (see below).
6. Press CONFIRM.

Setting	Unit	Mode	Number
Auto recovery after power failure	Grp	Mode1	1 - Inactive 2 - Active *1 3 - NO FUNCTION

*1 Approx. 4-minute delay after power is restored.

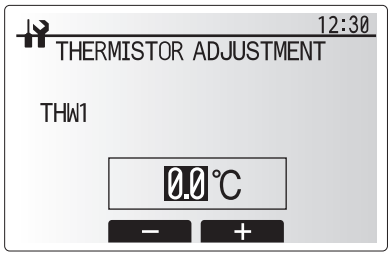




<Thermistor adjustment>

This function allows adjustments to be made to the thermistor readings from −10 to 10°C in 0.5°C intervals.

THW1: Thermistor (Flow water temp.)
THW2: Thermistor (Return water temp.)
THW5A: Thermistor (DHW tank upper water temp.)
THW5B: Thermistor (DHW tank lower water temp.)
THW6: Thermistor (Zone1 flow temp.)(Option)
THW7: Thermistor (Zone1 return temp.)(Option)
THW8: Thermistor (Zone2 flow temp.)(Option)
THW9: Thermistor (Zone2 return temp.)(Option)
THW10: Thermistor (Mixing tank water temp.)(Option)
THWB1: Thermistor (Boiler flow water temp.)(Option)

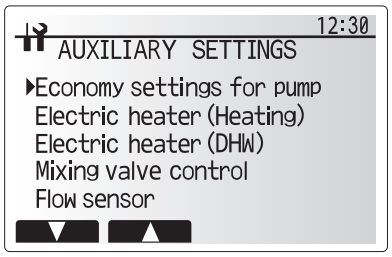


<Auxiliary settings>

This function is used to set the parameters for any auxiliary parts used in the system

Menu subtitle		Function/ Description
Economy settings for pump		Water pump stops automatically in certain period of time from when operation is finished.
	Delay	Time before pump switched off *1
Electric heater (Heating)		To select “WITH booster heater (ON)” or “WITHOUT booster heater (OFF)” in Heating mode.
	Delay	The minimum time required for the booster heater to turn ON from after Heating mode has started.
Electric heater (DHW)		To select "WITH (ON)" or "WITHOUT (OFF)" booster heater or immersion heater individually in DHW mode.
	Delay	The minimum time required for the booster heater or immersion heater to turn ON from after DHW mode has started. (This setting is applied for both booster and immersion heater.)
Mixing valve control *2	Running	Period from valve fully open (at a hot water mixing ratio of 100%) to valve fully closed (at a cold water mixing ratio of 100%)
	Interval	Interval (min.) to control the Mixing valve.
Flow sensor *3	Minimum	The minimum flow rate to be detected at Flow sensor.
	Maximum	The maximum flow rate to be detected at Flow sensor.

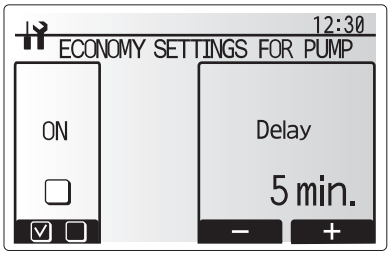
*1 Decreasing "time before pump switched off" may increase the duration of stand-by in heating mode.
*2 Set the Running time according to the specifications of the actuator of each mixing valve. It is recommended to set the interval to 2 minutes that is a default value. With the interval set longer, it could take longer to warm up a room.
*3 Do not change the setting since it is set according to the specification of Flow sensor attached to the heat pump unit.



Auxiliary settings menu screen

Economy settings for pump

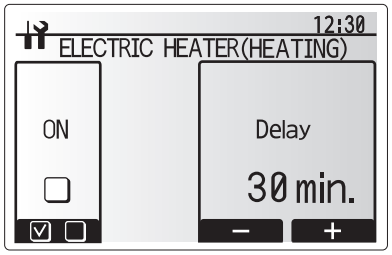
1. From the Auxiliary settings menu highlight Economy Settings for water circulation pump.
2. Press CONFIRM.
3. The economy settings for water circulation pump screen is displayed.
4. Use button F1 to switch the economy settings ON/OFF.
5. Use buttons F3 and F4 to adjust the time the water circulation pump will run. (3–60 minutes)



Economy settings for pump screen

Electric heater (Heating)

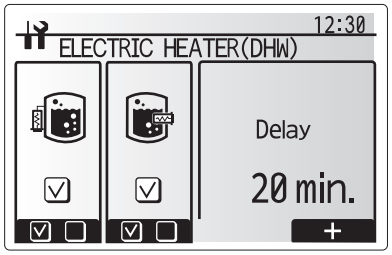
1. From the Auxiliary settings menu highlight Electric heater (Heating).
2. Press CONFIRM.
3. The Electric heater (Heating) screen is displayed.
4. Press F1 button to switch the function ON/OFF.
5. Use F3 and F4 buttons to adjust the time period of heat pump only operation before the booster heater will assist in space heating. (5–180 minutes)



Electric heater (Heating) screen

Electric heater (DHW)

1. From the Auxiliary settings menu highlight Electric heater (DHW).
2. Press CONFIRM.
3. The Electric heater (DHW) screen is displayed.
4. Press F1 and F2 buttons to switch the function ON/OFF. (F1: booster heater, F2: immersion heater)
5. Use F3 and F4 buttons to adjust the time period of heat pump only operation before the booster heater and the immersion heater (if present) will assist in DHW heating. (15–30 minutes)



Electric heater (DHW) screen

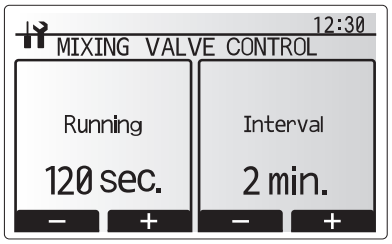
Mixing valve control

1. From the Auxiliary settings menu highlight Mixing valve control.
2. Press CONFIRM.
3. The Mixing valve control screen is displayed.
4. Use F1 and F2 buttons to set Running time between 10 to 240 seconds. The Running time equals to a period from full open of the valve (at a hot water mixing ratio of 100%) to full close (at a cold water mixing ratio of 100%).

Note: Set the Running time according to the specifications of the actuator of each mixing valve.

1. From the Auxiliary settings menu highlight Mixing valve control.
2. Press CONFIRM.
3. The Mixing valve control screen is displayed.
4. Press F3 and F4 buttons to set the interval between 2-zone temperature controls of the mixing valve between 1 to 30 minutes.

Note: It is recommended to set the interval to 2 minutes that is a default value. With the interval set longer, it could take longer to warm up a room.

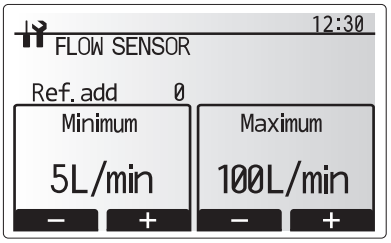


Mixing valve control setting screen

Flow sensor

1. From the Auxiliary settings menu highlight Flow sensor.
2. Press CONFIRM.
3. The Flow sensor screen is displayed.
4. Use F1 and F2 buttons to set the minimum flow rate of flow sensor between 0 to maximum L/min.
5. Use F3 and F4 buttons to set the maximum flow rate of flow sensor between minimum to 100L/min.

Note: Do not change the setting since it is set according to the specification of flow sensor attached to the heat pump unit.



Flow sensor setting screen

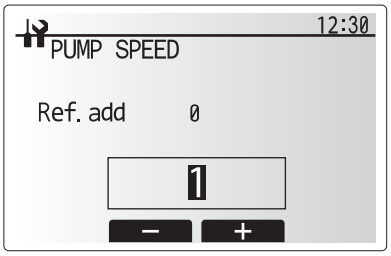
<Heat source setting>

The default heat source setting is heat pump and all electric heaters present in the system to be operational. This is referred to as Standard operation on the menu.

Heat source setting screen

<Pump speed>

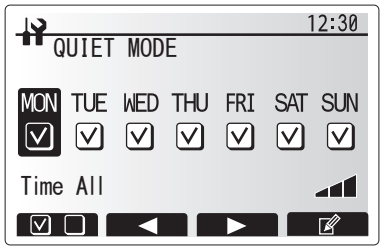
1. From the Service menu highlight Pump speed.
2. Press CONFIRM.
3. The Pump speed screen is displayed.
4. Use F2 and F3 buttons to set the pump speed of the water circulation pump between 1 and 5.



Pump speed setting screen

<Heat pump settings>

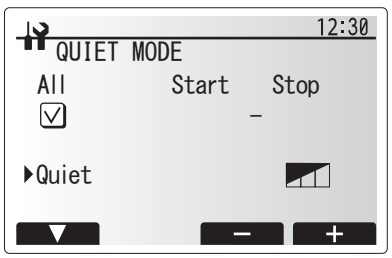
Heat pump flow rate range



Quiet mode

This function can provide additional quietness if more quietness is required.

1. From the Heat pump settings menu highlight Quiet mode.
2. Press CONFIRM.
3. Use F2 and F3 buttons to select days.
4. Press F4 button to edit quiet level and time.
5. Select time settings or level settings using the F1 button.
6. Use the F3 and F4 buttons to set the time or level.



<Operation settings>

Heating operation

This function allows operational setting of flow temperature range from the Ecodan and also the time interval at which the FTC collects and processes data for the auto adaptation mode.

Menu subtitle		Function	Range	Unit	Default
Flow temp. range	Minimum temp.	To minimize the loss by frequent ON and OFF in mild outdoor ambient temperature seasons.	20 to 45	ºC	30
	Maximum temp.	To set max. possible flow temperature according to the type of heat emitters.	35 to 60	ºC	50
Room temp. control	Mode	Setting for Room temp. control At Fast mode, target outlet water temperature is set higher than the one set at normal mode. This reduces the time to reach the target room temperature when the room temperature is relatively low.*	Normal/ Fast	—	Normal
	Interval	Selectable according to the heat emitter type and the materials of floor (i.e. radiators, floor heating-thick, -thin concrete, wood, etc.)	10 to 60	min	10
Heat pump thermo diff.adjust	ON/OFF	To minimize the loss by frequent ON and OFF in mild outdoor ambient temperature seasons.	ON/OFF	—	ON
	Lower limit	Prohibits heat pump operation until the flow temperature drops below the target flow temperature plus lower limit value.	−9 to −1	ºC	−5
	Upper limit	Allows heat pump operation until the flow temperature rises above the target flow temperature plus upper limit value.	+3 to +5	ºC	+5

< Heating operation (Room temp. control table) >

Notes:

1. The minimum flow temperature that prohibits heat pump operation is 20ºC.
2. The maximum flow temperature that allows heat pump operation equals to the maximum temperature set in the Flow temp. range menu.

* Fast mode is not efficient and will increase running cost compared to normal mode.

Freeze stat function

Menu subtitle		Function/ Description
Freeze stat function *1		An operational function to prevent the water circuit from freezing when outdoor ambient temperature drops.
	Flow t.	The target outlet water temperature at water circuit when operating in Freeze stat function. *2
	Outdoor ambient temp.	Minimum outdoor ambient temperature which freeze stat function will begin to operate, (3–20ºC) or choose**. If asterisk (**) is chosen freeze stat function is deactivated. (i.e. primary water freeze risk)"

*1. When the system is turned off, freeze stat function is not enabled.

*2. Flow t. is fixed to 20°C and unchangeable.

Simultaneous Operation

For periods of very low outside temperature this mode can be used. Simultaneous operation allows both DHW and space heating to run together by using the heat pump and/or booster heater to provide space heating whilst only the immersion heater provides heating for DHW. This operation is only available if BOTH a DHW tank AND immersion heater are present on the system.

- Range of outdoor ambient temperature at which simultaneous operation starts is −30 to 10°C (default −15°C).
- System shall automatically return to routine operation. This will happen when the outdoor ambient temperature rises above the selected temperature for this specific mode of operation.

Cold weather function

For extremely low outdoor ambient temperature conditions when the heat pump's capacity is restricted the heating or DHW is provided only by the electric booster heater (and immersion if present). This function is intended for use during extreme cold periods only. Extensive use of direct electrical heaters ONLY will result in higher power consumption and may reduce working life of heaters and related parts.

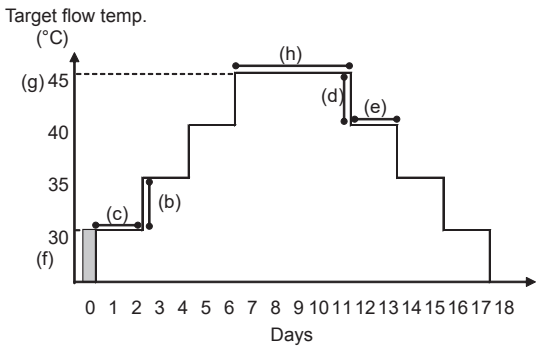
- Range of outdoor ambient temperature at which cold weather function starts is −30 to −10°C (default −15°C).
- System shall automatically return to routine operation. This will happen when the outdoor ambient temperature rises above the selected temperature for this specific mode of operation.

Floor dry up function

The Floor dry up function automatically changes the target hot water temperature in stages to gradually dry concrete when this particular type of underfloor heating system is installed.

Upon completion of the operation the system stops all the operations except the Freeze stat.

For Floor dry up function, the target flow temp. of Zone1 is the same as that of Zone2.



- Disconnect wiring to external inputs of room thermostat, demand control, and outdoor thermostat, or the target flow temperature may not be maintained.

Functions		Symbol	Description	Option/Range	Unit	Default
Floor dry up function		a	Sets the function to ON and power on the system using the main remote controller, and the dry up heating operation will start.	ON/OFF	—	OFF
Flow temp. (increase)	Flow temp. increase step	b	Sets the increase step of the target flow temperature.	+1 to +10	ºC	+5
	Increase interval	c	Sets the period for which the same target flow temperature is maintained.	1 to 7	day	2
Flow temp. (decrease)	Flow temp. decrease step	d	Sets the decrease step of the target flow temperature.	−1 to −10	ºC	−5
	Decrease interval	e	Sets the period for which the same target flow temperature is maintained.	1 to 7	day	2
Target temperature	Start & Finish	f	Sets the target flow temperature at the start and the finish of the operation.	20 to 60	ºC	30
	Max. target temp.	g	Sets the maximum target flow temperature.	20 to 60	ºC	45
	Max. temp. period	h	Sets the period for which the maximum target flow temperature is maintained.	1 to 20	day	5

<Energy monitor settings>

1. General description

End user can monitor accumulated(*1) 'Consumed electrical energy' and 'Delivered heat energy' in each operation mode(*2) on the main remote controller.

*1 Monthly and Year to date

*2 - DHW operation
- Space heating

Refer to the menu tree in "8-4. Main Settings Menu" for how to check the energy, and "9-8. FUNCTION OF SWITCHES" for the details on DIP-SW setting.
Either one of the following 2 methods is used for monitoring.

Note: Method 1 should be used as a guide. If a certain accuracy is required, the 2nd method should be used.

(1) Calculation internally

Electricity consumption is calculated internally based on the energy consumption of refrigerant and brine circuit, electric heater, water pump(s) and other auxiliaries.*3

Delivered heat is calculated internally by multiplying delta T (Flow and Return temp.) and flow rate measured by the factory fitted sensors.

Set the electric heater capacity and water pump(s) input and specs of additional pump(s) supplied locally. (Refer to the menu tree in "8-4. Main Settings Menu")

	Booster heater1	Booster heater2	Immersion heater *1	Pump1 *2	Pump2	Pump3
EHGT17D-YM9ED	3 kW	6 kW	0 kW	***(factory fitted pump)	When additional pumps supplied locally are connected as Pump2/3, change setting according to specs of the pumps.	

*1 Change setting to 1 kW when connecting optional immersion heater "PAC-IH01V2-E".

*2 "****" displayed in the energy monitor setting mode means the factory fitted pump is connected as Pump 1 so that the input is automatically calculated.

When anti-freeze solution (propylene glycol) is used for primary water circuit, set the delivered energy adjustment if necessary.
For further detail of above, refer to the menu tree in "8-4. Main Settings Menu".

(2) Actual measurement by external meter (locally supplied)

FTC has external input terminals for 2 'Electric energy meters' and a 'Heat meter'.

If two 'Electric energy meters' are connected, the 2 recorded values will be combined at the FTC and shown on the main remote controller.
(e.g. Meter 1 for H/P power line, Meter 2 for heater power line)

Refer to the [Signal inputs] in section "5. WIRING DIAGRAM" for more information on connectable electric energy meter and heat meter.

● Connectable electric energy meter and heat meter

- Pulse meter type: Voltage free contact for 12VDC detection by FTC (TBI.2 1pin, TBI.3 5 and 7 pins have a positive voltage.)
- Pulse duration: Minimum ON time: 40 ms
Minimum OFF time: 100 ms
- Possible unit of pulse: 0.1 pulse/kWh, 1 pulse/kWh, 10 pulse/kWh, 100 pulse/kWh, 1000 pulse/kWh

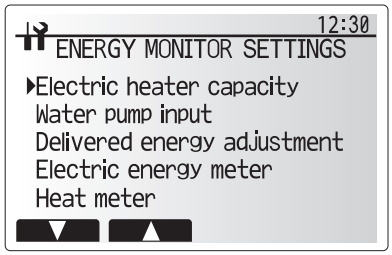
Those values can be set by the main remote controller. (Refer to the menu tree in "8-4. Main Settings Menu".)

2. Settings using the main remote controller

In this menu, all parameters required to record the consumed electrical energy and the delivered heat energy which is displayed on the main remote controller can be set. The parameters are an electric heater capacity, supply power of water pump and heat meter pulse.

Follow the procedure described in General Operation for the set up operation.

For Pump 1, *** can be also set besides this setting.
In the case *** is selected, the system acknowledges "factory fitted pump" is selected.



Energy monitor settings menu screen

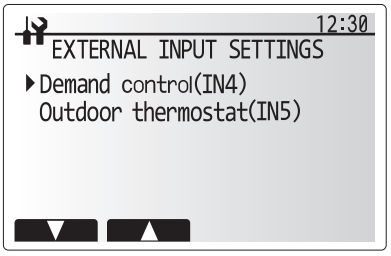
<External input settings>

Demand control(IN4)

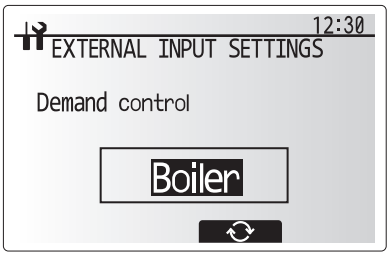
The selection of “OFF”, whilst a signal is being sent to IN4, forcefully stops all the heat source operations and the selection of “Boiler” stops operations of heat pump and electric heater and performs boiler operation.

Outdoor thermostat (IN5)

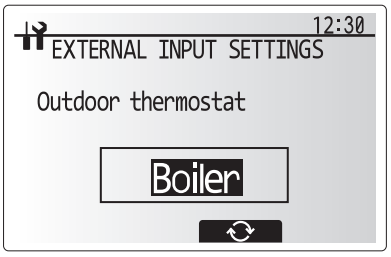
The selection of “Heater”, whilst a signal is being sent to IN5, performs electric-heater-only operation and the selection of “Boiler” performs boiler operation.



External input settings menu screen



Demand control screen

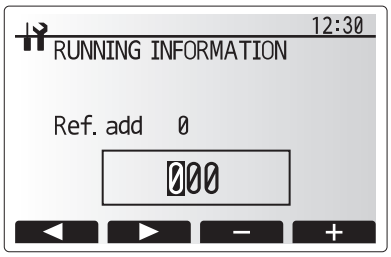


Outdoor thermostat setting screen

<Running information>

This function shows current temperature and other data of main component parts of heat pump unit.

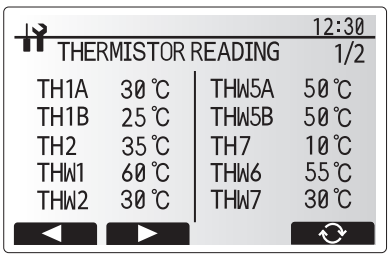
1. From the Service menu highlight Running information.
2. Press CONFIRM.
3. Use the function buttons to enter index code for the component to be viewed. (See 8-6. Request code list.)
4. Press CONFIRM.



<Thermistor reading>

This function shows the current readings of thermistors located on the water and refrigerant circuit

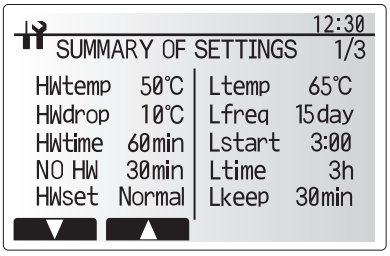
Thermistor	Description	Thermistor	Description
TH1A	Zone1 room temperature	THW6	Zone1 flow water temperature
TH1B	Zone2 room temperature	THW7	Zone1 return water temperature
TH2	Refrigerant return temperature	THW8	Zone2 flow water temperature
THW1	Water flow temperature	THW9	Zone2 return water temperature
THW2	Water return temperature	THW10	Mixing tank water temperature
THW5A	DHW tank upper water temperature	THWB1	Boiler flow water temperature
THW5B	DHW tank lower water temperature	TH32	Brine inlet temperature
TH7	Ambient (outdoor) temperature	TH34	Brine outlet temperature



<Summary of settings>

This function shows the current installer/user entered settings.

Abbreviation	Explanation	Abbreviation	Explanation
HWtemp	DHW max. temperature	**Z2 mode**	Operation mode
HWdrop	DHW temperature drop		- HER (Heating room temperature)
HWtime	DHW max. operation time		- HE (Heating flow temperature)
NO HW	DHW mode restriction		- HCC (Heating compensation curve)
HWset	DHW operation mode (Normal/Eco)	**Hroom 1**	Heating target room temperature
Ltemp	Legionella hot water temperature	**Hroom 2**	Heating target room temperature
Lfreq	Legionella operation Frequency	**Hflow 1**	Heating target flow temperature
Lstart	Legionella mode start time	**Hflow 2**	Heating target flow temperature
Ltime	Legionella max. operation time	**FSflow**	Freeze stat function flow temperature
Lkeep	Duration of max. (Legionella) hot water temperature	**FSout**	Freeze stat function ambient temperature
Z1 mode	Operation mode		
	- HER (Heating room temperature)		
	- HE (Heating flow temperature)		
	- HCC (Heating compensation curve)		



<Error history>

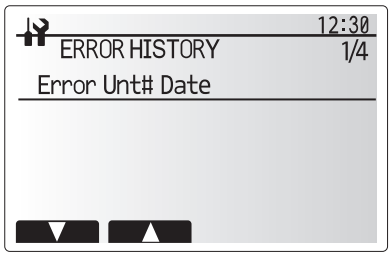
Error history allows the service engineer to view previous error codes, the unit address and the date on which they occurred. Up to 16 error codes can be stored in the history the most recent Error event is displayed at the top of the list.

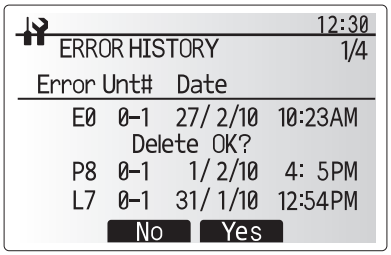
1. From the service menu select Error history
2. Press CONFIRM.

Please see "9-4. Self diagnosis and action" for error code diagnosis and actions.

To delete an Error history item;

1. From Error history screen press F4 button (Rubbish bin icon)
2. Then press F3 button (Yes).





<Password protection>

Password protection is available to prevent unauthorised access to the service menu by untrained persons.

1. From the service menu use F1 and F2 buttons to scroll through list until Password protection is highlighted.
2. Press CONFIRM.
3. When password input screen is displayed use buttons F1 and F2 to move left and right between the 4 digits, F3 to lower the selected digit by 1, and F4 to increase the selected digit by 1.
4. When you have input your password press CONFIRM.

Password input screen

5. The password verify screen is displayed.
6. To verify your new password press button F3.
7. Your password is now set and the completion screen is displayed.

Password verify screen

Resetting the password

If you forget the password you entered, or have to service a unit somebody else installed, you can reset the password to the factory default of **0000**.

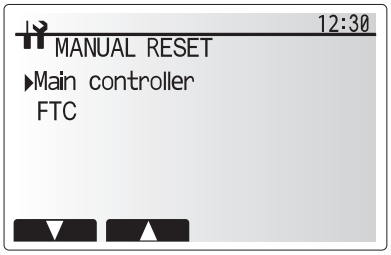
1. From the main settings menu scroll down the functions until Service Menu is highlighted.
2. Press CONFIRM.
3. You will be prompted to enter a password.
4. Hold down buttons F3 and F4 together for 3 seconds.
5. You will be asked if you wish to continue and reset the password to default setting.
6. To reset press button F3.
7. The password is now reset to **0000**.

Completion screen

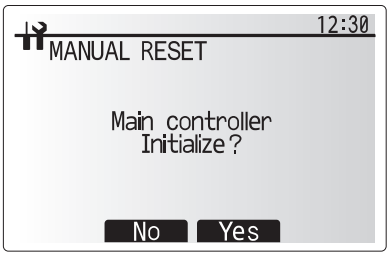
<Manual reset>

Should you wish to restore the initial settings at any time you should use the manual reset function. Please note this will reset ALL functions to the factory default settings.

1. From the service menu use F1 and F2 buttons to scroll through list until Manual Reset is highlighted.
2. Press CONFIRM.
3. The Manual reset screen is displayed.
4. Choose either Manual Reset for FTC or Main remote controller.



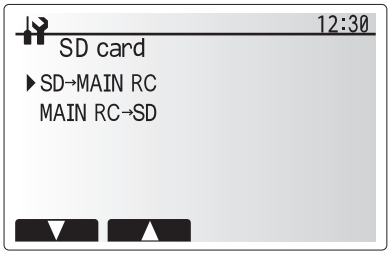
5. Press F3 button to confirm manual reset of chosen device.



<SD card>

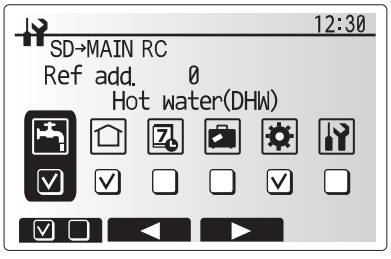
The use of an SD memory card simplifies the main remote controller settings in the field.

*Ecodan service tool (for use with PC tool) is necessary for the setting.



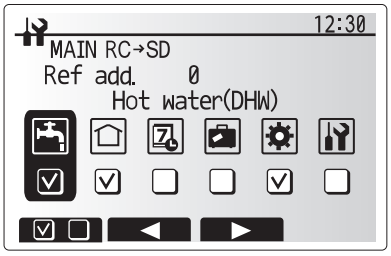
SD → Main RC

1. From the SD card setting use F1 and F2 buttons to scroll through list until "SD → Main RC" is highlighted.
2. Press CONFIRM.
3. Use F1, F2 and F3 buttons to select a menu to write to the main remote controller.
4. Press CONFIRM to start downloading.
5. Wait for a few minutes until "Complete!" appears.



Main RC → SD

1. From the SD card setting use F1 and F2 buttons to scroll through list until Main RC → SD is highlighted.
2. Press CONFIRM.
3. Use F1, F2 and F3 buttons to select a menu to write to the SD memory card.
4. Press CONFIRM to start uploading.
5. Wait for a few minutes until "Complete!" appears.



8-6. Request code list

Request code	Request content	Description (Display range)	Unit	Remarks
0	Operation state	Refer to 8-6-1. Detail Contents in Request Code.	–	
1	Compressor-Operating current (rms)	0 to 50	A	
2	Compressor-Accumulated operating time	0 to 9999	10 hours	
3	Compressor-Number of operation times	0 to 9999	100 times	
4	Discharge temperature (TH4)	3 to 217	°C	
5	C.B. -Liquid pipe 1 temperature (TH3)	−40 to +90	°C	
6				
7				
8				
9	C.B.-Outside air temperature (TH7)	−39 to +88	°C	
10	C.B.-Heat sink temperature (TH8)	−40 to +200	°C	
11				
12	Discharge superheat (SHd)	0 to 255	°C	
13	Sub-cool (SC)	0 to 130	°C	
14	Condensing temperature (T_{63HS})	−39 to +88	°C	
15				
16	Compressor-Operating frequency	0 to 255	Hz	
17	Compressor-Target operating frequency	0 to 255	Hz	
18	Brine pump output step	0 to 10	Step	
19	Brine pump speed	0 to 9999	rpm	
20				
21				
22	LEV (A) opening	0 to 500	Pulses	
23				
24				
25	Primary current	0 to 50	A	
26	DC bus voltage	180 to 370	V	
27	C.B. - Brine inlet temperature (TH32)	-39 to +88	°C	
28	C.B. - Brine outlet temperature (TH34)	-39 to +88	°C	
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48	Thermostat ON operating time	0 to 999	Minutes	
49				
50				
51	C.B.-Control state	Refer to 8-6-1.Detail Contents in Request Code.	—	
52	Compressor-Frequency control state	Refer to 8-6-1.Detail Contents in Request Code.	—	
53	C.B.-Fan control state	Refer to 8-6-1.Detail Contents in Request Code.	—	
54	Actuator output state	Refer to 8-6-1.Detail Contents in Request Code.	—	
55	Error content (U9)	Refer to 8-6-1.Detail Contents in Request Code.	—	
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				

Request code	Request content	Description (Display range)	Unit	Remarks
70	C.B.-Capacity setting display	Refer to 8-6-1.Detail Contents in Request Code.	–	
71	C.B.-Setting information	Refer to 8-6-1.Detail Contents in Request Code.	–	
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	C.B.-Microprocessor version information	Examples) Ver 5.01 → "0501"	Ver	
91	C.B.-Microprocessor version information (sub No.)	Auxiliary information (displayed after version information) Examples) Ver 5.01 A000 → "A000"	–	
92				
93				
94				
95				
96				
97				
98				
99				
100	C.B. - Error postponement history 1 (latest)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
101	C.B. - Error postponement history 2 (previous)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
102	C.B. - Error postponement history 3 (last but one)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
103	Error history 1 (latest)	Displays error history. ("– –" is displays if no history is present.)	Code	
104	Error history 2 (second to last)	Displays error history. ("– –" is displays if no history is present.)	Code	
105	Error history 3 (third to last)	Displays error history. ("– –" is displays if no history is present.)	Code	
106	Abnormal thermistor display (TH3/TH7/TH8)	3: TH3 7: TH7 8: TH8 0: No thermistor error	Sensor number	
107	Operation mode at time of error	Displayed in the same way as request code "0".	–	
108	Compressor-Operating current at time of error	0 to 50	A	
109	Compressor-Accumulated operating time at time of error	0 to 9999	10 hours	
110	Compressor-Number of operation times at time of error	0 to 9999	100 times	
111	Discharge temperature at time of error	3 to 217	°C	
112	C.B. -Liquid pipe 1 temperature (TH3) at time of error	−40 to +90	°C	
113	C.B. - Brine outlet temperature (TH34) at time of error	−39 to +88	°C	
114				
115	C.B. - Brine inlet temperature (TH32) at time of error	−39 to +88	°C	
116	C.B.-Outside air temperature (TH7) at time of error	−39 to +88	°C	
117	C.B.-Heat sink temperature (TH8) at time of error	−40 to +200	°C	
118	Discharge superheat (SHd) at time of error	0 to 255	°C	
119	Sub-cool (SC) at time of error	0 to 130	°C	
120	Compressor-Operating frequency at time of error	0 to 255	Hz	
121	C.B. at time of error • Brine pump output step	0 to 10	Step	
122	C.B. at time of error • Fan 1 speed	0 to 9999	rpm	
123				
124				
125	LEV (A) opening at time of error	0 to 500	Pulses	
126				
127				
128				

Request code	Request content	Description (Display range)	Unit	Remarks
129	Condensing temperature (T63HS) at the time of error	−39 to +88	°C	
130	Thermostat ON time until operation stops due to error	0 to 9999	Minutes	
154	Water circulation pump 1 - Accumulated operating time (after reset)	0 to 9999	10 hours	
156	Water circulation pump 2 - Accumulated operating time (after reset)	0 to 9999	10 hours	
157	Water circulation pump 3 - Accumulated operating time (after reset)	0 to 9999	10 hours	
158	Water circulation pump 4 - Accumulated operating time (after reset)	0 to 9999	10 hours	
162	FTC - DIP SW1 setting information	Refer to detail contents described hereinafter.	—	
163	FTC - DIP SW2 setting information	Refer to detail contents described hereinafter.	—	
164	FTC - DIP SW3 setting information	Refer to detail contents described hereinafter.	—	
165	FTC - DIP SW4 setting information	Refer to detail contents described hereinafter.	—	
166	FTC - DIP SW5 setting information	Refer to detail contents described hereinafter.	—	
175	FTC - Output signal information	Refer to detail contents described hereinafter.	—	
176	FTC - Input signal information	Refer to detail contents described hereinafter.	—	
177	Mixing valve opening step	0 to 10	Step	
190	FTC - Software version 1st 4 digits	Refer to Note below.	—	
191	FTC - Software version last 4 digits	Refer to Note below.	—	
200	Initialisation of Function Setting	—	—	
340	Water circulation pump 1 - Accumulated operating time reset	—	—	
342	Water circulation pump 2 - Accumulated operating time reset	—	—	
343	Water circulation pump 3 - Accumulated operating time reset	—	—	
344	Water circulation pump 4 - Accumulated operating time reset	—	—	
504	FTC - Zone1 room temp. (TH1A)	−39 to +88	°C	
505	FTC - Ref. liquid temp. (TH2)	−39 to +88	°C	
506	FTC - Return water temp. (THW2)	−39 to +88	°C	
507	FTC - Zone2 room temp. (TH1B)	−39 to +88	°C	
508	FTC - DHW tank lower water temp. (THW5B)	−39 to +88	°C	
509	FTC - Zone1 flow water temp. (THW6)	−39 to +88	°C	
510	FTC - Outside air temp. (TH7)	−39 to +88	°C	
511	FTC - Flow water temp. (THW1)	−39 to +88	°C	
512	FTC - Zone1 return water temp. (THW7)	−39 to +88	°C	
513	FTC - Zone2 flow water temp. (THW8)	−39 to +88	°C	
514	FTC - Zone2 return water temp. (THW9)	−39 to +88	°C	
515	FTC - Boiler flow water temp. (THWB1)	−40 to +140	°C	
534	FTC - DHW tank upper temp. (THW5A)	−39 to +88	°C	
535	FTC - Mixing tank water temp. (THW10)	−40 to +140	°C	
540	Flow rate of the primary circuit	0 to 100	L/min	
550	FTC - Error postponement history 1 (latest)	Displays postponement code. ("– –" is displays if no postponement code is present.)	—	
551	FTC - Operation control at time of error	0 Standard, 1 Heater, 2 Boiler	—	
552	FTC - Operation mode at time of error	0: OFF, 1: DHW, 2: Heating, 3: Cooling, 4: Legionella prevention, 5: Freeze protection, 6: Operation stop, 7: Defrost	—	
553	FTC - Output signal information at time of error	Refer to detail contents described hereinafter.	—	
554	FTC - Input signal information at time of error	Refer to detail contents described hereinafter.	—	
555	FTC - Zone1 room temp. (TH1A) at time of error	−39 to +88	°C	
556	FTC - Zone2 room temp. (TH1B) at time of error	−39 to +88	°C	
557	FTC - Ref. liquid temp. (TH2) at time of error	−39 to +88	°C	
558	FTC - Flow water temp. (THW1) at time of error	−39 to +88	°C	
559	FTC - Return water temp. (THW2) at time of error	−39 to +88	°C	
560	FTC - DHW tank water temp. (THW5B) at time of error	−39 to +88	°C	
561	FTC - Zone1 flow water temp. (THW6) at time of error	−39 to +88	°C	
562	FTC - Zone1 return water temp. (THW7) at time of error	−39 to +88	°C	
563	FTC - Zone2 flow water temp. (THW8) at time of error	−39 to +88	°C	
564	FTC - Zone2 return water temp. (THW9) at time of error	−39 to +88	°C	
565	FTC - Boiler flow water temp. (THWB1) at time of error	−40 to +140	°C	
567	FTC - Failure (P1/P2/L5/L8/Ld) thermistor	0: Failure thermistor is none, 1: TH1A, 2: TH2, 3: THW1, 4: THW2, 5: THWB1, 6: THW5B, 8: TH1B, A: THW6, B: THW7, C: THW8, D: THW9	—	
568	Mixing valve opening step at time of error	0 to 10	Step	
569	Operated Flow switch at time of failure (L9)	0: No operated flow switch, 1: Flow switch 1, 2: Flow switch 2, 3: Flow switch 3	—	
571	Flow rate at time of error	0 to 100	L/min	

Note

As only 4 digits can be displayed at one time the software version number is displayed in two halves.

Enter code 190 to see the first 4 digits and code 191 to see the last 4 digits.

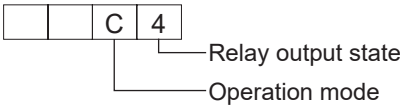
For example software version No. 5.01 A000, when code 190 is entered 0501 is displayed, when code 191 is entered A000 is displayed.

Request code 200 resets all Function Setting to the factory default settings.

8-6-1. Detail Contents in Request Code

[Operation state] (Request code :" 0")

Data display



Operation mode

Display	Operation mode
0	STOP • FAN
C	COOL • DRY
H	HEAT
d	DEFROST

Relay output state

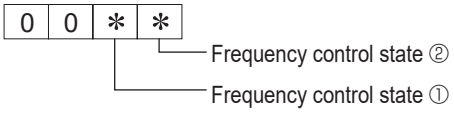
Display	Power currently supplied to compressor	Compressor	Four-way valve	Solenoid valve
0	–	–	–	–
1				ON
2			ON	
3			ON	ON
4		ON		
5		ON		ON
6		ON	ON	
7		ON	ON	ON
8	ON			
A	ON		ON	

[Outdoor unit – Control state] (Request code :" 51")

Data display				State
0	0	0	0	Normal
0	0	0	1	Preparing for heat operation
0	0	0	2	Defrost

[Compressor – Frequency control state] (Request code :" 52")

Data display



Frequency control state ①

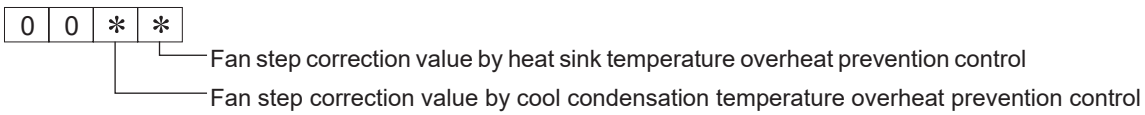
Display	Current limit control
0	No current limit
1	Primary current limit control is ON.
2	Secondary current limit control is ON.

Frequency control state ②

Display	Discharge temperature overheat prevention	Condensation temperature overheat prevention	Anti-freeze protection control	Heat sink temperature overheat prevention
0				
1	Controlled			
2		Controlled		
3	Controlled	Controlled		
4			Controlled	
5	Controlled		Controlled	
6		Controlled	Controlled	
7	Controlled	Controlled	Controlled	
8				Controlled
9	Controlled			Controlled
A		Controlled		Controlled
b	Controlled	Controlled		Controlled
C			Controlled	Controlled
d	Controlled		Controlled	Controlled
E		Controlled	Controlled	Controlled
F	Controlled	Controlled	Controlled	Controlled

[Fan control state] (Request code :" 53")

Data display



Display	Correction value
− (minus)	−1
0	0
1	+1
2	+2

[Actuator output state] (Request code :"54")

Data display 0 0 * *

- Actuator output state ①
- Actuator output state ②

Actuator output state ①

Display	SV1	Four-way valve	Compressor	Compressor is warming up
0				
1	ON			
2		ON		
3	ON	ON		
4			ON	
5	ON		ON	
6		ON	ON	
7	ON	ON	ON	
8				ON
9	ON			ON
A		ON		ON
b	ON	ON		ON
C			ON	ON
d	ON		ON	ON
E		ON	ON	ON
F	ON	ON	ON	ON

Actuator output state ②

Display	52C	SV2	SS
0			
1	ON		
2		ON	
3	ON	ON	
4			ON
5	ON		ON
6		ON	ON
7	ON	ON	ON

[Error content (U9)] (Request code :"55")

Data display 0 0 * *

- Error content ①
- Error content ②

Error content ① ●: Detected

Display	Overvoltage error	Undervoltage error	L_1-phase open error	Power synchronizing signal error
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
b	●	●		●
C			●	●
d	●		●	●
E		●	●	●
F	●	●	●	●

Error content ② ●: Detected

Display	Converter Fo error	PAM error
0		
1	●	
2		●
3	●	●

[Outdoor unit –Capacity setting display] (Request code : "70")

Data display	Capacity
9	35
10	50
11	60
14	71
20	100
25	125
28	140
40	200
50	250

[Outdoor unit – Setting information] (Request code : "71")

Data display 0 0 ✻ ✻

Setting information ①

Setting information ②

Setting information ①

Display	Defrost mode
0	Standard
1	For high humidity

Setting information ②

Display	Single-/ 3-phase	Heat pump/ cooling only
0	Single-phase	Heat pump
1		Cooling only
2	3-phase	Heat pump
3		Cooling only

FTC switch setting display (Request code: 162 to 166)

0: OFF 1: ON

SW1, SW2, SW3, SW4, SW5								Display
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	0	0	00 00
1	0	0	0	0	0	0	0	00 01
0	1	0	0	0	0	0	0	00 02
1	1	0	0	0	0	0	0	00 03
0	0	1	0	0	0	0	0	00 04
1	0	1	0	0	0	0	0	00 05
0	1	1	0	0	0	0	0	00 06
1	1	1	0	0	0	0	0	00 07
0	0	0	1	0	0	0	0	00 08
1	0	0	1	0	0	0	0	00 09
0	1	0	1	0	0	0	0	00 0A
1	1	0	1	0	0	0	0	00 0B
0	0	1	1	0	0	0	0	00 0C
1	0	1	1	0	0	0	0	00 0D
0	1	1	1	0	0	0	0	00 0E
1	1	1	1	0	0	0	0	00 0F
0	0	0	0	1	0	0	0	00 10
1	0	0	0	1	0	0	0	00 11
0	1	0	0	1	0	0	0	00 12
1	1	0	0	1	0	0	0	00 13
0	0	1	0	1	0	0	0	00 14
1	0	1	0	1	0	0	0	00 15
0	1	1	0	1	0	0	0	00 16
1	1	1	0	1	0	0	0	00 17
0	0	0	1	1	0	0	0	00 18
1	0	0	1	1	0	0	0	00 19
0	1	0	1	1	0	0	0	00 1A
1	1	0	1	1	0	0	0	00 1B
0	0	1	1	1	0	0	0	00 1C
1	0	1	1	1	0	0	0	00 1D
0	1	1	1	1	0	0	0	00 1E
1	1	1	1	1	0	0	0	00 1F
0	0	0	0	0	1	0	0	00 20
1	0	0	0	0	1	0	0	00 21
0	1	0	0	0	1	0	0	00 22
1	1	0	0	0	1	0	0	00 23
0	0	1	0	0	1	0	0	00 24
1	0	1	0	0	1	0	0	00 25
0	1	1	0	0	1	0	0	00 26
1	1	1	0	0	1	0	0	00 27
0	0	0	1	0	1	0	0	00 28
1	0	0	1	0	1	0	0	00 29
0	1	0	1	0	1	0	0	00 2A
1	1	0	1	0	1	0	0	00 2B
0	0	1	1	0	1	0	0	00 2C
1	0	1	1	0	1	0	0	00 2D
0	1	1	1	0	1	0	0	00 2E
1	1	1	1	0	1	0	0	00 2F
0	0	0	0	1	1	0	0	00 30
1	0	0	0	1	1	0	0	00 31
0	1	0	0	1	1	0	0	00 32
1	1	0	0	1	1	0	0	00 33
0	0	1	0	1	1	0	0	00 34
1	0	1	0	1	1	0	0	00 35
0	1	1	0	1	1	0	0	00 36
1	1	1	0	1	1	0	0	00 37
0	0	0	1	1	1	0	0	00 38
1	0	0	1	1	1	0	0	00 39
0	1	0	1	1	1	0	0	00 3A
1	1	0	1	1	1	0	0	00 3B
0	0	1	1	1	1	0	0	00 3C
1	0	1	1	1	1	0	0	00 3D
0	1	1	1	1	1	0	0	00 3E
1	1	1	1	1	1	0	0	00 3F

0: OFF 1: ON

SW1, SW2, SW3, SW4, SW5								Display
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	1	0	00 40
1	0	0	0	0	0	1	0	00 41
0	1	0	0	0	0	1	0	00 42
1	1	0	0	0	0	1	0	00 43
0	0	1	0	0	0	1	0	00 44
1	0	1	0	0	0	1	0	00 45
0	1	1	0	0	0	1	0	00 46
1	1	1	0	0	0	1	0	00 47
0	0	0	1	0	0	1	0	00 48
1	0	0	1	0	0	1	0	00 49
0	1	0	1	0	0	1	0	00 4A
1	1	0	1	0	0	1	0	00 4B
0	0	1	1	0	0	1	0	00 4C
1	0	1	1	0	0	1	0	00 4D
0	1	1	1	0	0	1	0	00 4E
1	1	1	1	0	0	1	0	00 4F
0	0	0	0	1	0	1	0	00 50
1	0	0	0	1	0	1	0	00 51
0	1	0	0	1	0	1	0	00 52
1	1	0	0	1	0	1	0	00 53
0	0	1	0	1	0	1	0	00 54
1	0	1	0	1	0	1	0	00 55
0	1	1	0	1	0	1	0	00 56
1	1	1	0	1	0	1	0	00 57
0	0	0	1	1	0	1	0	00 58
1	0	0	1	1	0	1	0	00 59
0	1	0	1	1	0	1	0	00 5A
1	1	0	1	1	0	1	0	00 5B
0	0	1	1	1	0	1	0	00 5C
1	0	1	1	1	0	1	0	00 5D
0	1	1	1	1	0	1	0	00 5E
1	1	1	1	1	0	1	0	00 5F
0	0	0	0	0	1	1	0	00 60
1	0	0	0	0	1	1	0	00 61
0	1	0	0	0	1	1	0	00 62
1	1	0	0	0	1	1	0	00 63
0	0	1	0	0	1	1	0	00 64
1	0	1	0	0	1	1	0	00 65
0	1	1	0	0	1	1	0	00 66
1	1	1	0	0	1	1	0	00 67
0	0	0	1	0	1	1	0	00 68
1	0	0	1	0	1	1	0	00 69
0	1	0	1	0	1	1	0	00 6A
1	1	0	1	0	1	1	0	00 6B
0	0	1	1	0	1	1	0	00 6C
1	0	1	1	0	1	1	0	00 6D
0	1	1	1	0	1	1	0	00 6E
1	1	1	1	0	1	1	0	00 6F
0	0	0	0	1	1	1	0	00 70
1	0	0	0	1	1	1	0	00 71
0	1	0	0	1	1	1	0	00 72
1	1	0	0	1	1	1	0	00 73
0	0	1	0	1	1	1	0	00 74
1	0	1	0	1	1	1	0	00 75
0	1	1	0	1	1	1	0	00 76
1	1	1	0	1	1	1	0	00 77
0	0	0	1	1	1	1	0	00 78
1	0	0	1	1	1	1	0	00 79
0	1	0	1	1	1	1	0	00 7A
1	1	0	1	1	1	1	0	00 7B
0	0	1	1	1	1	1	0	00 7C
1	0	1	1	1	1	1	0	00 7D
0	1	1	1	1	1	1	0	00 7E
1	1	1	1	1	1	1	0	00 7F

FTC switch setting display (Request code: 162 to 166)

0: OFF 1: ON

SW1, SW2, SW3, SW4, SW5								Display
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	0	1	00 80
1	0	0	0	0	0	0	1	00 81
0	1	0	0	0	0	0	1	00 82
1	1	0	0	0	0	0	1	00 83
0	0	1	0	0	0	0	1	00 84
1	0	1	0	0	0	0	1	00 85
0	1	1	0	0	0	0	1	00 86
1	1	1	0	0	0	0	1	00 87
0	0	0	1	0	0	0	1	00 88
1	0	0	1	0	0	0	1	00 89
0	1	0	1	0	0	0	1	00 8A
1	1	0	1	0	0	0	1	00 8B
0	0	1	1	0	0	0	1	00 8C
1	0	1	1	0	0	0	1	00 8D
0	1	1	1	0	0	0	1	00 8E
1	1	1	1	0	0	0	1	00 8F
0	0	0	0	1	0	0	1	00 90
1	0	0	0	1	0	0	1	00 91
0	1	0	0	1	0	0	1	00 92
1	1	0	0	1	0	0	1	00 93
0	0	1	0	1	0	0	1	00 94
1	0	1	0	1	0	0	1	00 95
0	1	1	0	1	0	0	1	00 96
1	1	1	0	1	0	0	1	00 97
0	0	0	1	1	0	0	1	00 98
1	0	0	1	1	0	0	1	00 99
0	1	0	1	1	0	0	1	00 9A
1	1	0	1	1	0	0	1	00 9B
0	0	1	1	1	0	0	1	00 9C
1	0	1	1	1	0	0	1	00 9D
0	1	1	1	1	0	0	1	00 9E
1	1	1	1	1	0	0	1	00 9F
0	0	0	0	0	1	0	1	00 A0
1	0	0	0	0	1	0	1	00 A1
0	1	0	0	0	1	0	1	00 A2
1	1	0	0	0	1	0	1	00 A3
0	0	1	0	0	1	0	1	00 A4
1	0	1	0	0	1	0	1	00 A5
0	1	1	0	0	1	0	1	00 A6
1	1	1	0	0	1	0	1	00 A7
0	0	0	1	0	1	0	1	00 A8
1	0	0	1	0	1	0	1	00 A9
0	1	0	1	0	1	0	1	00 AA
1	1	0	1	0	1	0	1	00 AB
0	0	1	1	0	1	0	1	00 AC
1	0	1	1	0	1	0	1	00 AD
0	1	1	1	0	1	0	1	00 AE
1	1	1	1	0	1	0	1	00 AF
0	0	0	0	1	1	0	1	00 B0
1	0	0	0	1	1	0	1	00 B1
0	1	0	0	1	1	0	1	00 B2
1	1	0	0	1	1	0	1	00 B3
0	0	1	0	1	1	0	1	00 B4
1	0	1	0	1	1	0	1	00 B5
0	1	1	0	1	1	0	1	00 B6
1	1	1	0	1	1	0	1	00 B7
0	0	0	1	1	1	0	1	00 B8
1	0	0	1	1	1	0	1	00 B9
0	1	0	1	1	1	0	1	00 BA
1	1	0	1	1	1	0	1	00 BB
0	0	1	1	1	1	0	1	00 BC
1	0	1	1	1	1	0	1	00 BD
0	1	1	1	1	1	0	1	00 BE
1	1	1	1	1	1	0	1	00 BF

0: OFF 1: ON

SW1, SW2, SW3, SW4, SW5								Display
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	1	1	00 C0
1	0	0	0	0	0	1	1	00 C1
0	1	0	0	0	0	1	1	00 C2
1	1	0	0	0	0	1	1	00 C3
0	0	1	0	0	0	1	1	00 C4
1	0	1	0	0	0	1	1	00 C5
0	1	1	0	0	0	1	1	00 C6
1	1	1	0	0	0	1	1	00 C7
0	0	0	1	0	0	1	1	00 C8
1	0	0	1	0	0	1	1	00 C9
0	1	0	1	0	0	1	1	00 CA
1	1	0	1	0	0	1	1	00 CB
0	0	1	1	0	0	1	1	00 CC
1	0	1	1	0	0	1	1	00 CD
0	1	1	1	0	0	1	1	00 CE
1	1	1	1	0	0	1	1	00 CF
0	0	0	0	1	0	1	1	00 D0
1	0	0	0	1	0	1	1	00 D1
0	1	0	0	1	0	1	1	00 D2
1	1	0	0	1	0	1	1	00 D3
0	0	1	0	1	0	1	1	00 D4
1	0	1	0	1	0	1	1	00 D5
0	1	1	0	1	0	1	1	00 D6
1	1	1	0	1	0	1	1	00 D7
0	0	0	1	1	0	1	1	00 D8
1	0	0	1	1	0	1	1	00 D9
0	1	0	1	1	0	1	1	00 DA
1	1	0	1	1	0	1	1	00 DB
0	0	1	1	1	0	1	1	00 DC
1	0	1	1	1	0	1	1	00 DD
0	1	1	1	1	0	1	1	00 DE
1	1	1	1	1	0	1	1	00 DF
0	0	0	0	0	1	1	1	00 E0
1	0	0	0	0	1	1	1	00 E1
0	1	0	0	0	1	1	1	00 E2
1	1	0	0	0	1	1	1	00 E3
0	0	1	0	0	1	1	1	00 E4
1	0	1	0	0	1	1	1	00 E5
0	1	1	0	0	1	1	1	00 E6
1	1	1	0	0	1	1	1	00 E7
0	0	0	1	0	1	1	1	00 E8
1	0	0	1	0	1	1	1	00 E9
0	1	0	1	0	1	1	1	00 EA
1	1	0	1	0	1	1	1	00 EB
0	0	1	1	0	1	1	1	00 EC
1	0	1	1	0	1	1	1	00 ED
0	1	1	1	0	1	1	1	00 EE
1	1	1	1	0	1	1	1	00 EF
0	0	0	0	1	1	1	1	00 F0
1	0	0	0	1	1	1	1	00 F1
0	1	0	0	1	1	1	1	00 F2
1	1	0	0	1	1	1	1	00 F3
0	0	1	0	1	1	1	1	00 F4
1	0	1	0	1	1	1	1	00 F5
0	1	1	0	1	1	1	1	00 F6
1	1	1	0	1	1	1	1	00 F7
0	0	0	1	1	1	1	1	00 F8
1	0	0	1	1	1	1	1	00 F9
0	1	0	1	1	1	1	1	00 FA
1	1	0	1	1	1	1	1	00 FB
0	0	1	1	1	1	1	1	00 FC
1	0	1	1	1	1	1	1	00 FD
0	1	1	1	1	1	1	1	00 FE
1	1	1	1	1	1	1	1	00 FF

Output signal display (Request code: 175/553)

Please refer to Table 2 on relevant wiring diagram whilst using the following.

0: OFF 1: ON

OUT								Display
1	2	3	4	5A	5B	6	7	
0	0	0	0	0	0	0	0	xx 00
1	0	0	0	0	0	0	0	xx 01
0	1	0	0	0	0	0	0	xx 02
1	1	0	0	0	0	0	0	xx 03
0	0	1	0	0	0	0	0	xx 04
1	0	1	0	0	0	0	0	xx 05
0	1	1	0	0	0	0	0	xx 06
1	1	1	0	0	0	0	0	xx 07
0	0	0	1	0	0	0	0	xx 08
1	0	0	1	0	0	0	0	xx 09
0	1	0	1	0	0	0	0	xx 0A
1	1	0	1	0	0	0	0	xx 0B
0	0	1	1	0	0	0	0	xx 0C
1	0	1	1	0	0	0	0	xx 0D
0	1	1	1	0	0	0	0	xx 0E
1	1	1	1	0	0	0	0	xx 0F
0	0	0	0	1	0	0	0	xx 10
1	0	0	0	1	0	0	0	xx 11
0	1	0	0	1	0	0	0	xx 12
1	1	0	0	1	0	0	0	xx 13
0	0	1	0	1	0	0	0	xx 14
1	0	1	0	1	0	0	0	xx 15
0	1	1	0	1	0	0	0	xx 16
1	1	1	0	1	0	0	0	xx 17
0	0	0	1	1	0	0	0	xx 18
1	0	0	1	1	0	0	0	xx 19
0	1	0	1	1	0	0	0	xx 1A
1	1	0	1	1	0	0	0	xx 1B
0	0	1	1	1	0	0	0	xx 1C
1	0	1	1	1	0	0	0	xx 1D
0	1	1	1	1	0	0	0	xx 1E
1	1	1	1	1	0	0	0	xx 1F
0	0	0	0	0	1	0	0	xx 20
1	0	0	0	0	1	0	0	xx 21
0	1	0	0	0	1	0	0	xx 22
1	1	0	0	0	1	0	0	xx 23
0	0	1	0	0	1	0	0	xx 24
1	0	1	0	0	1	0	0	xx 25
0	1	1	0	0	1	0	0	xx 26
1	1	1	0	0	1	0	0	xx 27
0	0	0	1	0	1	0	0	xx 28
1	0	0	1	0	1	0	0	xx 29
0	1	0	1	0	1	0	0	xx 2A
1	1	0	1	0	1	0	0	xx 2B
0	0	1	1	0	1	0	0	xx 2C
1	0	1	1	0	1	0	0	xx 2D
0	1	1	1	0	1	0	0	xx 2E
1	1	1	1	0	1	0	0	xx 2F
0	0	0	0	1	1	0	0	xx 30
1	0	0	0	1	1	0	0	xx 31
0	1	0	0	1	1	0	0	xx 32
1	1	0	0	1	1	0	0	xx 33
0	0	1	0	1	1	0	0	xx 34
1	0	1	0	1	1	0	0	xx 35
0	1	1	0	1	1	0	0	xx 36
1	1	1	0	1	1	0	0	xx 37
0	0	0	1	1	1	0	0	xx 38
1	0	0	1	1	1	0	0	xx 39
0	1	0	1	1	1	0	0	xx 3A
1	1	0	1	1	1	0	0	xx 3B
0	0	1	1	1	1	0	0	xx 3C
1	0	1	1	1	1	0	0	xx 3D
0	1	1	1	1	1	0	0	xx 3E
1	1	1	1	1	1	0	0	xx 3F

0: OFF 1: ON

OUT								Display
1	2	3	4	5A	5B	6	7	
0	0	0	0	0	0	1	0	xx 40
1	0	0	0	0	0	1	0	xx 41
0	1	0	0	0	0	1	0	xx 42
1	1	0	0	0	0	1	0	xx 43
0	0	1	0	0	0	1	0	xx 44
1	0	1	0	0	0	1	0	xx 45
0	1	1	0	0	0	1	0	xx 46
1	1	1	0	0	0	1	0	xx 47
0	0	0	1	0	0	1	0	xx 48
1	0	0	1	0	0	1	0	xx 49
0	1	0	1	0	0	1	0	xx 4A
1	1	0	1	0	0	1	0	xx 4B
0	0	1	1	0	0	1	0	xx 4C
1	0	1	1	0	0	1	0	xx 4D
0	1	1	1	0	0	1	0	xx 4E
1	1	1	1	0	0	1	0	xx 4F
0	0	0	0	1	0	1	0	xx 50
1	0	0	0	1	0	1	0	xx 51
0	1	0	0	1	0	1	0	xx 52
1	1	0	0	1	0	1	0	xx 53
0	0	1	0	1	0	1	0	xx 54
1	0	1	0	1	0	1	0	xx 55
0	1	1	0	1	0	1	0	xx 56
1	1	1	0	1	0	1	0	xx 57
0	0	0	1	1	0	1	0	xx 58
1	0	0	1	1	0	1	0	xx 59
0	1	0	1	1	0	1	0	xx 5A
1	1	0	1	1	0	1	0	xx 5B
0	0	1	1	1	0	1	0	xx 5C
1	0	1	1	1	0	1	0	xx 5D
0	1	1	1	1	0	1	0	xx 5E
1	1	1	1	1	0	1	0	xx 5F
0	0	0	0	0	1	1	0	xx 60
1	0	0	0	0	1	1	0	xx 61
0	1	0	0	0	1	1	0	xx 62
1	1	0	0	0	1	1	0	xx 63
0	0	1	0	0	1	1	0	xx 64
1	0	1	0	0	1	1	0	xx 65
0	1	1	0	0	1	1	0	xx 66
1	1	1	0	0	1	1	0	xx 67
0	0	0	1	0	1	1	0	xx 68
1	0	0	1	0	1	1	0	xx 69
0	1	0	1	0	1	1	0	xx 6A
1	1	0	1	0	1	1	0	xx 6B
0	0	1	1	0	1	1	0	xx 6C
1	0	1	1	0	1	1	0	xx 6D
0	1	1	1	0	1	1	0	xx 6E
1	1	1	1	0	1	1	0	xx 6F
0	0	0	0	1	1	1	0	xx 70
1	0	0	0	1	1	1	0	xx 71
0	1	0	0	1	1	1	0	xx 72
1	1	0	0	1	1	1	0	xx 73
0	0	1	0	1	1	1	0	xx 74
1	0	1	0	1	1	1	0	xx 75
0	1	1	0	1	1	1	0	xx 76
1	1	1	0	1	1	1	0	xx 77
0	0	0	1	1	1	1	0	xx 78
1	0	0	1	1	1	1	0	xx 79
0	1	0	1	1	1	1	0	xx 7A
1	1	0	1	1	1	1	0	xx 7B
0	0	1	1	1	1	1	0	xx 7C
1	0	1	1	1	1	1	0	xx 7D
0	1	1	1	1	1	1	0	xx 7E
1	1	1	1	1	1	1	0	xx 7F

Output signal display (Request code: 175/553)

Please refer to Table 2 on relevant wiring diagram whilst using the following.

0: OFF 1: ON

OUT								Display
1	2	3	4	5A	5B	6	7	
0	0	0	0	0	0	0	1	xx 80
1	0	0	0	0	0	0	1	xx 81
0	1	0	0	0	0	0	1	xx 82
1	1	0	0	0	0	0	1	xx 83
0	0	1	0	0	0	0	1	xx 84
1	0	1	0	0	0	0	1	xx 85
0	1	1	0	0	0	0	1	xx 86
1	1	1	0	0	0	0	1	xx 87
0	0	0	1	0	0	0	1	xx 88
1	0	0	1	0	0	0	1	xx 89
0	1	0	1	0	0	0	1	xx 8A
1	1	0	1	0	0	0	1	xx 8B
0	0	1	1	0	0	0	1	xx 8C
1	0	1	1	0	0	0	1	xx 8D
0	1	1	1	0	0	0	1	xx 8E
1	1	1	1	0	0	0	1	xx 8F
0	0	0	0	1	0	0	1	xx 90
1	0	0	0	1	0	0	1	xx 91
0	1	0	0	1	0	0	1	xx 92
1	1	0	0	1	0	0	1	xx 93
0	0	1	0	1	0	0	1	xx 94
1	0	1	0	1	0	0	1	xx 95
0	1	1	0	1	0	0	1	xx 96
1	1	1	0	1	0	0	1	xx 97
0	0	0	1	1	0	0	1	xx 98
1	0	0	1	1	0	0	1	xx 99
0	1	0	1	1	0	0	1	xx 9A
1	1	0	1	1	0	0	1	xx 9B
0	0	1	1	1	0	0	1	xx 9C
1	0	1	1	1	0	0	1	xx 9D
0	1	1	1	1	0	0	1	xx 9E
1	1	1	1	1	0	0	1	xx 9F
0	0	0	0	0	1	0	1	xx A0
1	0	0	0	0	1	0	1	xx A1
0	1	0	0	0	1	0	1	xx A2
1	1	0	0	0	1	0	1	xx A3
0	0	1	0	0	1	0	1	xx A4
1	0	1	0	0	1	0	1	xx A5
0	1	1	0	0	1	0	1	xx A6
1	1	1	0	0	1	0	1	xx A7
0	0	0	1	0	1	0	1	xx A8
1	0	0	1	0	1	0	1	xx A9
0	1	0	1	0	1	0	1	xx AA
1	1	0	1	0	1	0	1	xx AB
0	0	1	1	0	1	0	1	xx AC
1	0	1	1	0	1	0	1	xx AD
0	1	1	1	0	1	0	1	xx AE
1	1	1	1	0	1	0	1	xx AF
0	0	0	0	1	1	0	1	xx B0
1	0	0	0	1	1	0	1	xx B1
0	1	0	0	1	1	0	1	xx B2
1	1	0	0	1	1	0	1	xx B3
0	0	1	0	1	1	0	1	xx B4
1	0	1	0	1	1	0	1	xx B5
0	1	1	0	1	1	0	1	xx B6
1	1	1	0	1	1	0	1	xx B7
0	0	0	1	1	1	0	1	xx B8
1	0	0	1	1	1	0	1	xx B9
0	1	0	1	1	1	0	1	xx BA
1	1	0	1	1	1	0	1	xx BB
0	0	1	1	1	1	0	1	xx BC
1	0	1	1	1	1	0	1	xx BD
0	1	1	1	1	1	0	1	xx BE
1	1	1	1	1	1	0	1	xx BF

0: OFF 1: ON

OUT								Display
1	2	3	4	5A	5B	6	7	
0	0	0	0	0	0	1	1	xx C0
1	0	0	0	0	0	1	1	xx C1
0	1	0	0	0	0	1	1	xx C2
1	1	0	0	0	0	1	1	xx C3
0	0	1	0	0	0	1	1	xx C4
1	0	1	0	0	0	1	1	xx C5
0	1	1	0	0	0	1	1	xx C6
1	1	1	0	0	0	1	1	xx C7
0	0	0	1	0	0	1	1	xx C8
1	0	0	1	0	0	1	1	xx C9
0	1	0	1	0	0	1	1	xx CA
1	1	0	1	0	0	1	1	xx CB
0	0	1	1	0	0	1	1	xx CC
1	0	1	1	0	0	1	1	xx CD
0	1	1	1	0	0	1	1	xx CE
1	1	1	1	0	0	1	1	xx CF
0	0	0	0	1	0	1	1	xx D0
1	0	0	0	1	0	1	1	xx D1
0	1	0	0	1	0	1	1	xx D2
1	1	0	0	1	0	1	1	xx D3
0	0	1	0	1	0	1	1	xx D4
1	0	1	0	1	0	1	1	xx D5
0	1	1	0	1	0	1	1	xx D6
1	1	1	0	1	0	1	1	xx D7
0	0	0	1	1	0	1	1	xx D8
1	0	0	1	1	0	1	1	xx D9
0	1	0	1	1	0	1	1	xx DA
1	1	0	1	1	0	1	1	xx DB
0	0	1	1	1	0	1	1	xx DC
1	0	1	1	1	0	1	1	xx DD
0	1	1	1	1	0	1	1	xx DE
1	1	1	1	1	0	1	1	xx DF
0	0	0	0	0	1	1	1	xx E0
1	0	0	0	0	1	1	1	xx E1
0	1	0	0	0	1	1	1	xx E2
1	1	0	0	0	1	1	1	xx E3
0	0	1	0	0	1	1	1	xx E4
1	0	1	0	0	1	1	1	xx E5
0	1	1	0	0	1	1	1	xx E6
1	1	1	0	0	1	1	1	xx E7
0	0	0	1	0	1	1	1	xx E8
1	0	0	1	0	1	1	1	xx E9
0	1	0	1	0	1	1	1	xx EA
1	1	0	1	0	1	1	1	xx EB
0	0	1	1	0	1	1	1	xx EC
1	0	1	1	0	1	1	1	xx ED
0	1	1	1	0	1	1	1	xx EE
1	1	1	1	0	1	1	1	xx EF
0	0	0	0	1	1	1	1	xx F0
1	0	0	0	1	1	1	1	xx F1
0	1	0	0	1	1	1	1	xx F2
1	1	0	0	1	1	1	1	xx F3
0	0	1	0	1	1	1	1	xx F4
1	0	1	0	1	1	1	1	xx F5
0	1	1	0	1	1	1	1	xx F6
1	1	1	0	1	1	1	1	xx F7
0	0	0	1	1	1	1	1	xx F8
1	0	0	1	1	1	1	1	xx F9
0	1	0	1	1	1	1	1	xx FA
1	1	0	1	1	1	1	1	xx FB
0	0	1	1	1	1	1	1	xx FC
1	0	1	1	1	1	1	1	xx FD
0	1	1	1	1	1	1	1	xx FE
1	1	1	1	1	1	1	1	xx FF

Output signal display (Request code: 175/553)

Please refer to Table 2 on relevant wiring diagram whilst using the following.

0: OFF 1: ON

OUT								Display
8 *	9	10	11	12	13	14	15	
0	0	0	0	0	0	0	0	00 xx
1	0	0	0	0	0	0	0	01 xx
0	1	0	0	0	0	0	0	02 xx
1	1	0	0	0	0	0	0	03 xx
0	0	1	0	0	0	0	0	04 xx
1	0	1	0	0	0	0	0	05 xx
0	1	1	0	0	0	0	0	06 xx
1	1	1	0	0	0	0	0	07 xx
0	0	0	1	0	0	0	0	08 xx
1	0	0	1	0	0	0	0	09 xx
0	1	0	1	0	0	0	0	0A xx
1	1	0	1	0	0	0	0	0B xx
0	0	1	1	0	0	0	0	0C xx
1	0	1	1	0	0	0	0	0D xx
0	1	1	1	0	0	0	0	0E xx
1	1	1	1	0	0	0	0	0F xx
0	0	0	0	1	0	0	0	10 xx
1	0	0	0	1	0	0	0	11 xx
0	1	0	0	1	0	0	0	12 xx
1	1	0	0	1	0	0	0	13 xx
0	0	1	0	1	0	0	0	14 xx
1	0	1	0	1	0	0	0	15 xx
0	1	1	0	1	0	0	0	16 xx
1	1	1	0	1	0	0	0	17 xx
0	0	0	1	1	0	0	0	18 xx
1	0	0	1	1	0	0	0	19 xx
0	1	0	1	1	0	0	0	1A xx
1	1	0	1	1	0	0	0	1B xx
0	0	1	1	1	0	0	0	1C xx
1	0	1	1	1	0	0	0	1D xx
0	1	1	1	1	0	0	0	1E xx
1	1	1	1	1	0	0	0	1F xx
0	0	0	0	0	1	0	0	20 xx
1	0	0	0	0	1	0	0	21 xx
0	1	0	0	0	1	0	0	22 xx
1	1	0	0	0	1	0	0	23 xx
0	0	1	0	0	1	0	0	24 xx
1	0	1	0	0	1	0	0	25 xx
0	1	1	0	0	1	0	0	26 xx
1	1	1	0	0	1	0	0	27 xx
0	0	0	1	0	1	0	0	28 xx
1	0	0	1	0	1	0	0	29 xx
0	1	0	1	0	1	0	0	2A xx
1	1	0	1	0	1	0	0	2B xx
0	0	1	1	0	1	0	0	2C xx
1	0	1	1	0	1	0	0	2D xx
0	1	1	1	0	1	0	0	2E xx
1	1	1	1	0	1	0	0	2F xx
0	0	0	0	1	1	0	0	30 xx
1	0	0	0	1	1	0	0	31 xx
0	1	0	0	1	1	0	0	32 xx
1	1	0	0	1	1	0	0	33 xx
0	0	1	0	1	1	0	0	34 xx
1	0	1	0	1	1	0	0	35 xx
0	1	1	0	1	1	0	0	36 xx
1	1	1	0	1	1	0	0	37 xx
0	0	0	1	1	1	0	0	38 xx
1	0	0	1	1	1	0	0	39 xx
0	1	0	1	1	1	0	0	3A xx
1	1	0	1	1	1	0	0	3B xx
0	0	1	1	1	1	0	0	3C xx
1	0	1	1	1	1	0	0	3D xx
0	1	1	1	1	1	0	0	3E xx
1	1	1	1	1	1	0	0	3F xx

* Displayed only when the request code is 553.

0: OFF 1: ON

OUT								Display
8	9	10	11	12	13	14	15	
0	0	0	0	0	0	1	0	40 xx
1	0	0	0	0	0	1	0	41 xx
0	1	0	0	0	0	1	0	42 xx
1	1	0	0	0	0	1	0	43 xx
0	0	1	0	0	0	1	0	44 xx
1	0	1	0	0	0	1	0	45 xx
0	1	1	0	0	0	1	0	46 xx
1	1	1	0	0	0	1	0	47 xx
0	0	0	1	0	0	1	0	48 xx
1	0	0	1	0	0	1	0	49 xx
0	1	0	1	0	0	1	0	4A xx
1	1	0	1	0	0	1	0	4B xx
0	0	1	1	0	0	1	0	4C xx
1	0	1	1	0	0	1	0	4D xx
0	1	1	1	0	0	1	0	4E xx
1	1	1	1	0	0	1	0	4F xx
0	0	0	0	1	0	1	0	50 xx
1	0	0	0	1	0	1	0	51 xx
0	1	0	0	1	0	1	0	52 xx
1	1	0	0	1	0	1	0	53 xx
0	0	1	0	1	0	1	0	54 xx
1	0	1	0	1	0	1	0	55 xx
0	1	1	0	1	0	1	0	56 xx
1	1	1	0	1	0	1	0	57 xx
0	0	0	1	1	0	1	0	58 xx
1	0	0	1	1	0	1	0	59 xx
0	1	0	1	1	0	1	0	5A xx
1	1	0	1	1	0	1	0	5B xx
0	0	1	1	1	0	1	0	5C xx
1	0	1	1	1	0	1	0	5D xx
0	1	1	1	1	0	1	0	5E xx
1	1	1	1	1	0	1	0	5F xx
0	0	0	0	0	1	1	0	60 xx
1	0	0	0	0	1	1	0	61 xx
0	1	0	0	0	1	1	0	62 xx
1	1	0	0	0	1	1	0	63 xx
0	0	1	0	0	1	1	0	64 xx
1	0	1	0	0	1	1	0	65 xx
0	1	1	0	0	1	1	0	66 xx
1	1	1	0	0	1	1	0	67 xx
0	0	0	1	0	1	1	0	68 xx
1	0	0	1	0	1	1	0	69 xx
0	1	0	1	0	1	1	0	6A xx
1	1	0	1	0	1	1	0	6B xx
0	0	1	1	0	1	1	0	6C xx
1	0	1	1	0	1	1	0	6D xx
0	1	1	1	0	1	1	0	6E xx
1	1	1	1	0	1	1	0	6F xx
0	0	0	0	1	1	1	0	70 xx
1	0	0	0	1	1	1	0	71 xx
0	1	0	0	1	1	1	0	72 xx
1	1	0	0	1	1	1	0	73 xx
0	0	1	0	1	1	1	0	74 xx
1	0	1	0	1	1	1	0	75 xx
0	1	1	0	1	1	1	0	76 xx
1	1	1	0	1	1	1	0	77 xx
0	0	0	1	1	1	1	0	78 xx
1	0	0	1	1	1	1	0	79 xx
0	1	0	1	1	1	1	0	7A xx
1	1	0	1	1	1	1	0	7B xx
0	0	1	1	1	1	1	0	7C xx
1	0	1	1	1	1	1	0	7D xx
0	1	1	1	1	1	1	0	7E xx
1	1	1	1	1	1	1	0	7F xx

Mixing valve state

OUT		Mixing valve state
5A	5B	
0	0	Stop
0	1	Stop
1	0	Open
1	1	Close

Input signal display (Request code: 176/554)

Please refer to Table 1 on relevant wiring diagram whilst using the following.

0: OFF (open) 1: ON (short)

IN								Display
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	0	0	00 00
1	0	0	0	0	0	0	0	00 01
0	1	0	0	0	0	0	0	00 02
1	1	0	0	0	0	0	0	00 03
0	0	1	0	0	0	0	0	00 04
1	0	1	0	0	0	0	0	00 05
0	1	1	0	0	0	0	0	00 06
1	1	1	0	0	0	0	0	00 07
0	0	0	1	0	0	0	0	00 08
1	0	0	1	0	0	0	0	00 09
0	1	0	1	0	0	0	0	00 0A
1	1	0	1	0	0	0	0	00 0B
0	0	1	1	0	0	0	0	00 0C
1	0	1	1	0	0	0	0	00 0D
0	1	1	1	0	0	0	0	00 0E
1	1	1	1	0	0	0	0	00 0F
0	0	0	0	1	0	0	0	00 10
1	0	0	0	1	0	0	0	00 11
0	1	0	0	1	0	0	0	00 12
1	1	0	0	1	0	0	0	00 13
0	0	1	0	1	0	0	0	00 14
1	0	1	0	1	0	0	0	00 15
0	1	1	0	1	0	0	0	00 16
1	1	1	0	1	0	0	0	00 17
0	0	0	1	1	0	0	0	00 18
1	0	0	1	1	0	0	0	00 19
0	1	0	1	1	0	0	0	00 1A
1	1	0	1	1	0	0	0	00 1B
0	0	1	1	1	0	0	0	00 1C
1	0	1	1	1	0	0	0	00 1D
0	1	1	1	1	0	0	0	00 1E
1	1	1	1	1	0	0	0	00 1F
0	0	0	0	0	1	0	0	00 20
1	0	0	0	0	1	0	0	00 21
0	1	0	0	0	1	0	0	00 22
1	1	0	0	0	1	0	0	00 23
0	0	1	0	0	1	0	0	00 24
1	0	1	0	0	1	0	0	00 25
0	1	1	0	0	1	0	0	00 26
1	1	1	0	0	1	0	0	00 27
0	0	0	1	0	1	0	0	00 28
1	0	0	1	0	1	0	0	00 29
0	1	0	1	0	1	0	0	00 2A
1	1	0	1	0	1	0	0	00 2B
0	0	1	1	0	1	0	0	00 2C
1	0	1	1	0	1	0	0	00 2D
0	1	1	1	0	1	0	0	00 2E
1	1	1	1	0	1	0	0	00 2F
0	0	0	0	1	1	0	0	00 30
1	0	0	0	1	1	0	0	00 31
0	1	0	0	1	1	0	0	00 32
1	1	0	0	1	1	0	0	00 33
0	0	1	0	1	1	0	0	00 34
1	0	1	0	1	1	0	0	00 35
0	1	1	0	1	1	0	0	00 36
1	1	1	0	1	1	0	0	00 37
0	0	0	1	1	1	0	0	00 38
1	0	0	1	1	1	0	0	00 39
0	1	0	1	1	1	0	0	00 3A
1	1	0	1	1	1	0	0	00 3B
0	0	1	1	1	1	0	0	00 3C
1	0	1	1	1	1	0	0	00 3D
0	1	1	1	1	1	0	0	00 3E
1	1	1	1	1	1	0	0	00 3F

0: OFF (open) 1: ON (short)

IN								Display
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	1	0	00 40
1	0	0	0	0	0	1	0	00 41
0	1	0	0	0	0	1	0	00 42
1	1	0	0	0	0	1	0	00 43
0	0	1	0	0	0	1	0	00 44
1	0	1	0	0	0	1	0	00 45
0	1	1	0	0	0	1	0	00 46
1	1	1	0	0	0	1	0	00 47
0	0	0	1	0	0	1	0	00 48
1	0	0	1	0	0	1	0	00 49
0	1	0	1	0	0	1	0	00 4A
1	1	0	1	0	0	1	0	00 4B
0	0	1	1	0	0	1	0	00 4C
1	0	1	1	0	0	1	0	00 4D
0	1	1	1	0	0	1	0	00 4E
1	1	1	1	0	0	1	0	00 4F
0	0	0	0	1	0	1	0	00 50
1	0	0	0	1	0	1	0	00 51
0	1	0	0	1	0	1	0	00 52
1	1	0	0	1	0	1	0	00 53
0	0	1	0	1	0	1	0	00 54
1	0	1	0	1	0	1	0	00 55
0	1	1	0	1	0	1	0	00 56
1	1	1	0	1	0	1	0	00 57
0	0	0	1	1	0	1	0	00 58
1	0	0	1	1	0	1	0	00 59
0	1	0	1	1	0	1	0	00 5A
1	1	0	1	1	0	1	0	00 5B
0	0	1	1	1	0	1	0	00 5C
1	0	1	1	1	0	1	0	00 5D
0	1	1	1	1	0	1	0	00 5E
1	1	1	1	1	0	1	0	00 5F
0	0	0	0	0	1	1	0	00 60
1	0	0	0	0	1	1	0	00 61
0	1	0	0	0	1	1	0	00 62
1	1	0	0	0	1	1	0	00 63
0	0	1	0	0	1	1	0	00 64
1	0	1	0	0	1	1	0	00 65
0	1	1	0	0	1	1	0	00 66
1	1	1	0	0	1	1	0	00 67
0	0	0	1	0	1	1	0	00 68
1	0	0	1	0	1	1	0	00 69
0	1	0	1	0	1	1	0	00 6A
1	1	0	1	0	1	1	0	00 6B
0	0	1	1	0	1	1	0	00 6C
1	0	1	1	0	1	1	0	00 6D
0	1	1	1	0	1	1	0	00 6E
1	1	1	1	0	1	1	0	00 6F
0	0	0	0	1	1	1	0	00 70
1	0	0	0	1	1	1	0	00 71
0	1	0	0	1	1	1	0	00 72
1	1	0	0	1	1	1	0	00 73
0	0	1	0	1	1	1	0	00 74
1	0	1	0	1	1	1	0	00 75
0	1	1	0	1	1	1	0	00 76
1	1	1	0	1	1	1	0	00 77
0	0	0	1	1	1	1	0	00 78
1	0	0	1	1	1	1	0	00 79
0	1	0	1	1	1	1	0	00 7A
1	1	0	1	1	1	1	0	00 7B
0	0	1	1	1	1	1	0	00 7C
1	0	1	1	1	1	1	0	00 7D
0	1	1	1	1	1	1	0	00 7E
1	1	1	1	1	1	1	0	00 7F

■ Water circuit only operation

When in water circuit only operation the FTC controller board has control functions.

	Indoor unit only operation
Water circuit	Necessary
Heat pump	Not necessary
Main remote controller	Necessary
DIP switch setting on the FTC controller board setting	Electric heater SW4-4 ON, SW4-5 ON
	Boiler SW4-4 ON, SW4-6 ON
Setting range for flow temp.	20–60°C Selectable
Setting range for tank temp.	40–60°C Selectable

<Heater>

Heating for DHW and space heating is provided by the heater.
• Activating water circuit only operation mode
To activate water circuit only operation see the following:
1. Change DIP switch SW4-4 and SW4-5 on the FTC controller board to ON.
2. Switch ON the breaker(s).
3. Water circuit only operation is now activated.

• Deactivating water circuit only operation mode
To deactivate water circuit only operation see the following:
1. Change DIP switch SW4-4 and SW4-5 on the FTC controller board to OFF.
2. Switch ON the breaker(s).
3. Water circuit only operation is now deactivated.

<Boiler>

Heating for space heating is provided by the boiler.
• Activating water circuit only operation mode
To activate water circuit only operation see the following:
1. Change DIP switch SW4-4 and SW4-6 on the FTC controller board to ON.
2. Switch ON the breaker(s).
3. Water circuit only operation is now activated.

• Deactivating water circuit only operation mode
To deactivate water circuit only operation see the following:
1. Change DIP switch SW4-4 and SW4-6 on the FTC controller board to OFF.
2. Switch ON the breaker(s).
3. Water circuit only operation is now deactivated.

■ Emergency operation

In emergency operation, an operation without connecting and main remote controller is possible.
When in Emergency operation the main control has NO control functions.
Space heating flow temp. is restarted 40°C and DHW tank temp. is restricted 50°C. *1

	Emergency operation
Water circuit	Necessary
Heat pump	Not necessary
Main remote controller	Not necessary
DIP switch setting on the FTC controller board	Electric heater SW4-5 ON
	Boiler SW4-6 ON
Setting range for flow temp.	Fixed at 40°C
Setting range for tank temp.	Fixed at 50°C *1

*1 Default setting is 50°C. Once system has started running, emergency operation runs at the latest set temp.

<Heater>

Heating for DHW and space heating is provided by the heater.
• Activating emergency operation mode
To activate emergency operation see the following:
1. Change DIP switch SW4-5 on the FTC controller board to ON.
2. Switch ON the breaker(s).
3. Emergency operation is now activated.

• Deactivating emergency operation mode
To deactivate emergency operation see the following:
1. Change DIP switch SW4-5 on the FTC controller board to OFF.
2. Switch ON the breaker(s).
3. Emergency operation is now deactivated.

<Boiler>

Heating for space heating is provided by the boiler.
• Activating emergency operation mode
To activate emergency operation see the following:
1. Change DIP switch SW4-6 on the FTC controller board to ON.
2. Switch ON the breaker(s).
3. Emergency operation is now activated.

• Deactivating emergency operation mode
To deactivate emergency operation see the following:
1. Change DIP switch SW4-6 on the FTC controller board to OFF.
2. Switch ON the breaker(s).
3. Emergency operation is now deactivated.

⚠ WARNING
Do not attempt to change the DIP switches whilst the breaker(s) are ON as this could result in ELECTROCUTION.

9 TROUBLESHOOTING

9-1. Troubleshooting

<Summary of self diagnosis based on error codes and service procedures>

Present and past error codes are logged, and they can be displayed on the main remote controller.
Please refer to the table below and subsequent explanations to diagnose and remedy typical problems that may occur in the field.

Unit Condition	Error Code	Action
Reoccurring problem	Displayed	Use table "9-4. Self diagnosis and action" to identify fault and correct.
	Not Displayed	Use table "9-5. Troubleshooting by inferior phenomena" to identify fault and correct.
Non reoccurring problem	Logged	1. Check temporary causes of defects such as the operation of safety devices on the refrigerant/water circuit including compressor, poor wiring, electrical noise, etc. Re-check the symptom and the installation environment, refrigerant amount (Split systems only), weather conditions at time of fault, etc. 2. Reset error code logs, Service the unit and restart system.
	Not Logged	1. Recheck the abnormal symptom
		2. Identify cause of problem and take corrective action according to Table "9-5. Troubleshooting by inferior phenomena".
		3. If no obvious problem can be found continue to operate the unit.

NOTE

Electrical components should only be replaced as a final option. Please follow instructions in "9-4. Self diagnosis and action" and "9-5. Troubleshooting by inferior phenomena" fully before resorting to replacing parts.

9-2. Test Run

Before a test run

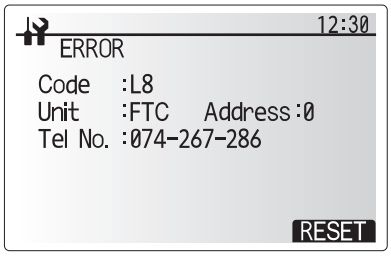
- After installation of pipework and electrical wiring, recheck that there is no water leakage, loosened connections or miswiring.
- Measure impedance between the ground and the power supply terminal block (L,N) on the heat pump unit with suitable (500V) ohmmeter. Resistance should be ≥ 1.0MΩ .
- Read the Installation and Operation Manuals fully especially the safety requirements before carrying out any test runs.

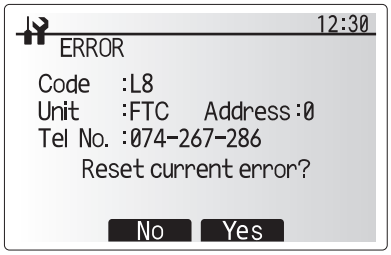
9-3. Malfunction diagnosis method by main remote controller

If during start up or operation a malfunction occurs the error code screen may be displayed on the main remote controller.
The error code screen shows the following; code, unit, ref. address, and telephone number of installer (only if previously entered by the installer)
Please note in the case of some malfunctions an error code is not generated please refer to table "9-5. Troubleshooting by inferior phenomena" for more details.

To reset

1. To reset the main remote controller press F4 button (Reset).
2. Then press F3 (Yes) to confirm.





9-4. Self diagnosis and action

■ Error Codes (FTC controller board)

Check if DIP SW is set correctly. (Refer to "9-8. FUNCTION OF SWITCHES".)

Error code	Title and display conditions	Possible Cause	Diagnosis and action
L3	**Circulation water temperature overheat protection** <DHW/Heating/LP/FS/OS> Error code displayed when THW1 detects a temp. ≥ 80ºC for 10 consecutive seconds or THW2 detects a temp. ≥ 80ºC for 10 consecutive seconds. DHW : Domestic hot water mode Heating : Heating mode LP : Legionella prevention mode FS : Freeze stat OS : Operation stop TH1A/B : Room temp. thermistor TH2 : Liquid refrigerant temp. thermistor THW1 : Flow water temp. thermistor THW2 : Return water temp. thermistor THW5A : Tank upper water temp. thermistor THW5B : Tank lower water temp. thermistor THW6 : Zone1 flow water temperature thermistor THW7 : Zone1 return water temperature thermistor THW8 : Zone2 flow water temperature thermistor THW9 : Zone2 return water temperature thermistor THW10 : Mixing tank water temperature thermistor THWB1 : Boiler water temperature thermistor	1. Insufficient system head 2. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit. 3. Valve operation fault 4. 2-way valve (local supply) actuator fault 5. 3-way valve actuator fault 6. Booster heater relay (BHC1, BHC2, BHCP) operating fault 7. Power supply voltage increase 8. THW1 or THW5B has become detached from its holder. 9. THW1 or THW2 fault 10. FTC board failure	1 Refer to table in "9-6. Checking Component Parts' Function" to determine if system pump meets requirements. If more head required either add a pump of the same size or replace existing pump with capacity model. See "10. DISASSEMBLY PROCEDURE" for how to replace pump. 2. Check circulation pump (See "9-6. Checking Component Parts' Function" for how to check). Open purge valve to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range. 3. Check valves on primary water circuit are installed level. 4. Electrically test to determine fault 5. 1) Electrically test to determine fault. 2) Operate 3-way valve manually using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu".) 3) Replace 3-way valve coil. 4) Replace 3-way valve. (Refer to Procedure 6 in “10. DISASSEMBLY PROCEDURE.” 6. Electrically test the relays (BHC1, BHC2, BHCP) to determine fault. See "9-6. Checking Component Parts' Function" for how to check. 7. Check the supply voltage. 8. Visually inspect location and reattach as necessary. 9. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function". Compare FTC detected temperature to hand held detector. 10. Replace board.
L4	**Tank water temperature overheat protection** <DHW/Heating/LP/FS/OS> Error code display when THW5B detects a temp. ≥ 75ºC for 10 consecutive seconds.	1. 3-way valve actuator fault 2. Immersion heater contactor (IHC) operating fault 3. THW5B fault 4. FTC board failure	1. 1) Electrically test to determine fault. 2) Operate 3-way valve manually using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu".) 3) Replace 3-way valve coil. 4) Replace 3-way valve. (Refer to Procedure 6 in “10. DISASSEMBLY PROCEDURE.” 2. Check immersion heater contactor (IHC). 3. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function". Compare FTC detected temperature to hand held detector. 4. Replace board.

Error code	Title and display conditions	Possible Cause	Diagnosis and action
P1/P2/L5/LD	**FTC thermistor failure** Note: The thermistors subject to failure can be checked in “Request code: 567” in “Running information. <DHW/Heating/LP/FS/OS> Error code displayed when thermistor is at open or short (see table). <u>Exceptions</u> Error code will not be displayed for TH2; During defrost and for 10 minutes after defrost operation.	1. Connector/terminal wire has become detached or loose wiring. 2. Thermistor fault 3. FTC failure 4. The thermistor on the wireless remote controller or the main remote controller may be defective. (when Room temp. is chosen for the Heating operation and when Main remote controller or Room RC 1-8 is chosen for the Room Sensor setting in the Initial setting) 5. Incorrect setting of the DIP switch(es)	1. Visually check the terminals and connections and reattaches appropriate. 2. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function". Compare FTC detected temperature to hand held detector. 3. Replace board. 4. Replace wireless remote controller or main remote controller. 5. Check the DIP switch setting(s).
L6	**Circulation water freeze protection <DHW/Heating/LP/FS/OS>** Error code displayed when THW1 detects a temp. ≤ 1ºC for 10 consecutive seconds or THW2 detects a temp. ≤ 3ºC for 10 consecutive seconds. <u>Exception</u> Error code will not be displayed if; FS function is disabled, For 10 minutes after water circulation pump1 is switched on.	1. Insufficient system head 2. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit 3. Valve operation fault 4. 2-way valve (local supply) actuator fault 5. 3-way valve actuator fault 6. THW1 has become detached from its holder. 7. THW1 or THW2 fault 8. FTC board failure	1. Refer to table in "9-6. Checking Component Parts' Function" to determine if system pump meets requirements. If more head required either add a pump of the same size or replace existing pump with capacity model. See "10. DISASSEMBLY PROCEDURE" for how to replace pump. 2. Check circulation pump (See "9-6. Checking Component Parts' Function" for how to check). Open purge valve to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range. 3. Check valves on primary water circuit are installed level. 4. Electrically test to determine fault. 5. 1) Electrically test to determine fault. 2) Operate 3-way valve manually using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu".) 3) Replace 3-way valve coil. 4) Replace 3-way valve. (Refer to Procedure 6 in “10. DISASSEMBLY PROCEDURE”.) 6. Visually inspect location and reattach as necessary. 7. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function". Compare FTC detected temperature to hand held detector. 8. Replace board.

Error code	Thermistor		Open detection	Short detection
	Symbol	Name		
P1	TH1A/TH1B	Room temperature thermistor	−39ºC or below	88.5ºC or above
P2	TH2	Liquid temperature thermistor	−39ºC or below	88.5ºC or above
L5	THW1	Flow water temperature thermistor	−39ºC or below	88.5ºC or above
	THW2	Return water temperature thermistor	−39ºC or below	88.5ºC or above
	THW5A	Tank upper water temperature thermistor	−39ºC or below	88.5ºC or above
	THW5B	Tank lower water temperature thermistor	−39ºC or below	88.5ºC or above
	THW6	Zone1 flow water temperature thermistor	−39ºC or below	88.5ºC or above
	THW7	Zone1 return water temperature thermistor	−39ºC or below	88.5ºC or above
	THW8	Zone2 flow water temperature thermistor	−39ºC or below	88.5ºC or above
	THW9	Zone2 return water temperature thermistor	−39ºC or below	88.5ºC or above
LD	THWB1	Boiler flow water temperature thermistor	−40ºC or below	140ºC or above

Error code	Title and display conditions	Possible Cause	Diagnosis and action
L8	**Heating operation error** Note: “3” is displayed in “Request code: 567” in “Running information”. <Heating/FS> If a), b) and c) occur, L8 is displayed; a) No change on THW1 and THW5A/B (under 1°C for 20 minutes from unit starts operation) b) No change on THW1 (under 1°C for 10 minutes from booster heater starts operation) c) THW1−THW2 < −5°C (for 10 minutes continuously)	1. THW1 has become detached from its holder. 2. Booster heater fault 3. THW1 or THW2 or THW5A/B fault 4. FTC board failure	1. Visually inspect location and reattach as necessary. 2. Electrically test to determine fault. See "9-6. Checking Component Parts' Function" for how to check. 3. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function". Compare FTC detected temperature to hand held detector. 4. Replace board.
	Heating operation error Note: “A” is displayed in “Request code: 567” in “Running information”.	1. THW6 has become detached from its holder. 2. THW6 or THW7 fault 3. FTC board failure	1. Visually inspect location and reattach as necessary. 2. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function". Compare FTC detected temperature to hand held detector. 3. Replace board.
	Heating operation error Note: “C” is displayed in “Request code: 567” in “Running information”.	1. THW8 has become detached from its holder. 2. THW8 or THW9 fault 3. FTC board failure	1. Visually inspect location and reattach as necessary. 2. Check resistance of thermistor against table in "9-6. Checking Component Parts' Function" Compare FTC detected temperature to hand held detector. 3. Replace board.
L9	**Low primary circuit (Heat source side) flow rate detected by flow sensor** Note: “1” is displayed in “Request code: 569” in “Running information”. <DHW/Heating/LP/FS> Error code displayed when flow sensor detects low flow rate for 10 seconds. <u>Exception</u> For 1 minute after water circulation pump1 is switched on.	1. Insufficient system head 2. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit. 3. Valve operation fault 4. 2-way valve (local supply) actuator fault 5. Connector/terminal wire has become detached or loose wiring. 6. Flow sensor fault 7. Incorrect setting of the SW2-2 on the FTC board 8. FTC board failure	1. Refer to table in "9-6. Checking Component Parts' Function" to determine if system pump meets requirements. If more head required either add a pump of the same size or replace existing pump with capacity model. See "10. DISASSEMBLY PROCEDURE" for how to replace pump. 2. Check circulation pump (See "9-6. Checking Component Parts' Function" for how to check). Open purge valve to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range. 3. Check valves on primary water circuit are installed level. 4. Electrically test to determine fault. 5. Visually check the CN1A connector and IN2 terminal and reattach if necessary. 6. Electrically test to determine fault. See "9-6. Checking Component Parts' Function" for how to check. 7. Check the SW2-2 on the FTC board setting. 8. Replace board.
	Low primary circuit (Zone1 side) flow rate detected by flow switch Note: “2” is displayed in “Request code: 569” in “Running information”.	1. Insufficient system head 2. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit. 3. Terminal wire has become detached or loose wiring. 4. Flow switch fault 5. Incorrect setting of the SW3-2 on the FTC board 6. FTC board failure	1. If more head required either add a pump of the same size or replace existing pump . 2. Check circulation pump (See "9-6. Checking Component Parts' Function" for how to check). Open purge valve to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range. 3. Visually check the IN3 terminal and reattach if necessary. 4. Electrically test to determine fault. 5. Check the SW3-2 on the FTC board setting. 6. Replace board.

Error code	Title and display conditions	Possible Cause	Diagnosis and action
L9	**Low primary circuit (Zone2 side) flow rate detected by flow switch** Note: "3" is displayed in "Request code: 569" in "Running information".	1. Insufficient system head 2. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit 3. Terminal wire has become detached or loose wiring. 4. Flow switch fault 5. Incorrect setting of the SW3-3 on the FTC board 6. FTC board failure	1. If more head required either add a pump of the same size or replace existing pump. 2. Check circulation pump (See "9-6. Checking Component Parts' Function" for how to check). Open purge valve to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range. 3. Visually check the IN7 terminal and reattach if necessary. 4. Electrically test to determine fault. 5. Check the SW3-3 setting on the FTC board. 6. Replace board.
LC	Boiler circulation water temperature overheat protection <DHW/Heating/LP/FS/OS> Error code displayed when THWB1 detects a temp. ≥80ºC for 10 consecutive seconds	1. The set temperature for Boiler is too high. 2. Flow rate of the heating circuit from the boiler may be reduced.	1. Check if the set temperature for Boiler for heating exceeds the restriction. (See the manual for the thermistors "PAC-TH011HT-E") 2. Check for • water leakage • strainer blockage • water circulation pump function.
LD	Boiler temperature thermistor (THWB1) failure	Refer to error codes (P1/P2/L5/LD).	
LE	Boiler operation error <Heating> Boiler is running and THW6 detects a temperature <30ºC for consecutive 60 minutes.	1. THW6 has become detached from its holder. 2. Incorrect wiring between FTC (OUT10) and the boiler. 3. Boiler fuel has run out or the system is OFF. 4. Boiler failure 5. FTC board failure	1. Visually inspect location and reattach as necessary. 2. See the manual of the thermistors "PAC-TH011HT-E". 3. Check the status of the boiler. 4. Check the status of the boiler. 5. Replace board.
LF	Flow sensor failure	Disconnection or loose connection of flow sensor	Check flow sensor cable for damage or loose connections.
LH	Boiler circulation water freeze protection	Flow rate of the heating circuit from the boiler may be reduced.	Check for • water leakage • strainer blockage • water circulation pump function.
LJ	DHW operation error (type of external plate HEX)	1. DHW tank water temp. thermistor (THW5A/B) has become detached from its holder. 2. Flow rate of the sanitary circuit may be reduced.	1. Check for disconnection of DHW tank water temp. thermistor (THW5A/B). 2. Check for water circulation pump function.
LL	Setting errors of DIP switches on FTC control board	Incorrect setting of DIP switches. 1. Boiler operation 2. 2-zone temperature control	1. For boiler operation, check that DIP SW1-1 is set to ON (With Boiler) and DIP SW2-6 is set to ON (With Mixing Tank). 2. For 2-zone temperature control, check DIP SW2-7 on the FTC board is set to ON (2-zone) and DIP SW2-6 on the FTC board is set to ON (With Mixing Tank).
P1	Indoor temperature thermistor (TH1) failure	Refer to error codes (P1/P2/L5/LD).	
P2	Indoor temperature thermistor (TH2) failure	Refer to error codes (P1/P2/L5/LD).	
E0/E4	**Main remote controller communication failure (Reception error)** Error code E0 is displayed if main remote controller does not receive any signal from the FTC for ref. address "0" for 3 minutes. Error code E4 is displayed if FTC does not receive any data from the main remote controller for 3 minutes or FTC does not receive any signal from the main remote controller for 2 minutes.	1. Contact failure with transmission cable 2. Wiring procedure not observed. (Cable length/cable diameter/number of main remote controllers) 3. Fault on the FTC board section controlling Ref. address "0" 4. Fault with the main remote controller circuit board 5. Electrical noise causes interference with transmission/reception of data for main remote controller.	1. Check connection cable for damage or loose connections at the FTC and main remote controller terminals. 2. Check main remote controller and FTC common wiring max cable length 500 m. Only use 2-core cable. Only connect 1 main remote controller to 1 FTC board. 3. to 5. If the problem is not solved by the above measures then: Turn the power to the unit OFF and then ON. If the E4 code is still displayed the FTC and/or the main remote controller circuit board should be replaced.

Error code	Title and display conditions	Possible Cause	Diagnosis and action
E3/E5	**Main remote controller communication failure (Transmission error)** Error code E3 is displayed if the main remote controller cannot find an empty transmission path and thus fails to transmit for 6 seconds or the data received by the main remote controller is different to what was sent (by the main remote controller) 30 consecutive times. Error code E5 is displayed if the FTC cannot find an empty transmission path for 3 minutes and thus cannot transmit or the data sent by the FTC is different to what was expected 30 consecutive times.	1. 2 or more main remote controllers have been connected to the FTC. 2. Fault with main remote controller transmission/receiving circuit board 3. Fault with the main remote controller circuit board 4. Electrical noise causes interference with transmission/reception of data for main remote controller.	1. Only connect 1 main remote controller to 1 FTC board. 2. to 4. Turn the power to the unit OFF and then ON. If the E3/E5 code is still displayed the FTC and/or the main remote controller circuit board should be replaced.
E6	**FTC/Controller circuit board communication failure (Reception error)** Error code E6 is displayed if after the power is switched ON to the unit, the FTC board does not receive any signal or the signal received is not complete for 6 minutes, or after a period of operation the FTC board does not receive any signal or the signal received is not complete for 3 minutes.	1. Contact failure/short circuit/miswiring 2. Fault with controller circuit board transmission/receiving circuit board 3. Fault with FTC transmission/receiving circuit board 4. Electrical noise causes interference with FTC-controller circuit board transmission cable.	* Check the LED display on the controller circuit board (Connect the A-control service tool, PAC-SK52ST to test.) 1. Check the connections on the FTC and controller circuit board have not become loose and that the connecting cable is not damaged. 2. to 4. Turn the power to the unit OFF and then ON. If the E6 code is still displayed the FTC and/or the controller circuit board should be replaced.
E7	**FTC/Controller circuit board communication failure (Transmission error)** Error code E7 is displayed if despite the FTC board sending signal "0", signal "1" is received 30 consecutive times.	1. Fault with FTC transmission/receiving circuit board 2. Electrical noise causes interference with power supply. 3. Electrical noise causes interference with FTC-controller circuit board transmission cable.	1. to 3. Turn the power to the unit OFF and then ON. If the E7 code is still displayed the FTC circuit board should be replaced.
E1/E2	**Main remote controller control board failure** Error code E1 displayed if main remote controller cannot access it is non volatile (non power dependent) memory. Error code E2 is displayed when there is a fault with the main remote controller's internal clock.	1. Fault with the main remote controller circuit board	1. Replace main remote controller circuit board.
J0	**FTC/wireless receiver communication failure** Error code J0 is displayed when the FTC cannot receive data from the wireless receiver for 1 minute.	1. Connection fault with wireless receiver-FTC connection 2. Fault with FTC receiving circuit board 3. Fault with wireless receiver's transmission circuit board 4. Electrical noise causes interference with wireless receiver communication cable.	1. Check the connections to the wireless receiver and FTC have not become loose and that the connecting cable is not damaged. 2. to 4. Turn the power to the unit OFF and then ON. If the J0 code is still displayed the FTC and/or the wireless receiver circuit board should be replaced.
J1 to J8	**Wireless remote controller/wireless receiver communication failure (Reception error)** Error code displayed if wireless receiver receives no/incomplete data from the wireless remote controller for 15 consecutive minutes. The digit after the J refers to the address of the wireless remote controller that has the error. E.g. Error code "J3" refers to a communication fault between the wireless receiver and wireless remote control with address 3.	1. Battery on wireless remote control may be flat 2. The wireless remote controller is out of range of the wireless receiver. 3. Fault with wireless remote controller transmission circuit board 4. Fault with wireless receiver's reception circuit board	1 Check and replace the battery if necessary the wireless remote controller battery. 2. to 4. Reposition the wireless remote control closer to the receiver and perform a communication test. For procedure refer to wireless remote controller installation manual. If "OK" is displayed then the cause of the J1 to J8 error was the controller was out of range of the receiver. The wireless remote controller should be installed within range of the receiver. If "Err" is displayed replace wireless remote controller with a new controller and perform the pairing procedure. If after this procedure the "Err" code is still displayed the fault is with the receiver unit (attached to the FTC). The receiver unit should be replaced with a new part and the original remote control can be reconnected. If "OK" is displayed then the fault is with the remote control and this should be replaced.

Note: To cancel error codes please switch system off (press button F4 (RESET) on main remote controller).

■ Error Codes (Controller circuit board)

Code	Error	Cause	Action
None	—	1. No voltage is supplied to terminal block (TB1) of heat pump unit. a) Power supply breaker is turned off. b) Contact failure or disconnection of power supply terminal c) Open phase (L or N phase)	1. Check following items. a) Power supply breaker b) Connection of power supply terminal block (TB1) c) Connection of power supply terminal block (TB1)
		2. Electric power is not charged to power supply terminal of power circuit board. a) Contact failure of power supply terminal b) Open phase on the power circuit board	2. Check following items. a) Connection of power supply terminal block (TB1) b) Connection of terminal on power circuit board Check connection of the connector LI or NI.
		3. Electric power is not supplied to controller circuit board. a) Disconnection of connector (CNDC)	3. Check connection of the connector (CNDC) on the controller circuit board. Check connection of the connector, CNDC on the noise filter.
		4. Disconnection of reactor (ACL)	4. Check connection of reactor. (ACL)
		5. Disconnection of noise filter circuit board or parts failure in noise filter circuit board	5. a) Check connection of noise filter circuit board. b) Replace noise filter circuit board.
		6. Defective power circuit board	6. Replace power circuit board.
		7. Defective controller circuit board	7. Replace controller circuit board (When items above are checked but the units cannot be repaired).
		8. Brine pump manual operation	8. Check DIP SW6-3 and turn it OFF.
		9. Disconnection of wire between UNIT SIDE and MODULE SIDE.	9. Refer to 'How to remove the module'. Check connection of the wire between UNIT SIDE and MODULE SIDE.
		10. Wrong thermistor position	10. Check thermistor position and change to correct position.
F5 (5201)	**63H connector open** Abnormal if 63H connector circuit is open for 3 minutes continuously after power supply. 63H: High pressure switch	1. Disconnection or contact failure of 63H connector on controller circuit board.	1. Check connection of 63H connector on controller circuit board.
		2. Disconnection or contact failure of 63H	2. Check the 63H side of connecting wire.
		3. 63H is working due to defective parts.	3. Check continuity by tester. Replace the parts if the parts are defective.
		4. Defective controller circuit board	4. Replace controller circuit board.
U1 (1302)	**High pressure (High pressure switch 63H operated)** Abnormal if high pressure switch 63H operated (4.15 MPa) during compressor operation. 63H: High pressure switch	1. Clogged or broken pipe	1. Check piping and repair defect.
		2. Locked brine pump	2. to 5. Check heat pump unit and repair defect.
		3. Malfunction of brine pump	
		4. Short cycle of refrigerant or brine circuit	
		5. Dirt of brine circuit heat exchanger	
		6. Decreased brine flow rate	6. Check the brine flow rate.
		7. Disconnection or contact failure of connector (63H) on controller circuit board	7. to 9. Turn the power off and check F5 is displayed when the power is turned again.
		8. Disconnection or contact failure of 63H connection	
		9. Defective controller circuit board	
		10. Defective action of linear expansion valve	10. Check linear expansion valve.
		11. Malfunction of brine pump driving circuit	11. Replace controller circuit board.
U2 (1102)	**High discharge temperature** (1) Abnormal if TH4 exceeds 125°C or 110°C continuously for 5 minutes. (2) Abnormal if discharge superheat (Heating: TH4−T63HS) exceeds 70°C continuously for 10 minutes. TH4: Thermistor <Discharge> **High comp. surface temperature** Abnormal if TH33 exceeds 125°C. In the case of high comp. surface temperature error, compressor does not restart unless the thermistor (TH33) becomes less than 95°C. TH33: Thermistor <Comp. surface>	1. Overheated compressor operation caused by shortage of refrigerant	1. Check intake superheat. Check leakage of refrigerant. Charge additional refrigerant.
		2. Defective thermistor	2., 3. Turn the power off and check if U3 is displayed when the power is turned on again. When U3 is displayed, refer to 'Judgment and action' for U3.
		3. Defective controller circuit board	
		4. Defective action of linear expansion valve	4. Check linear expansion valve.
		5. Clogging with foreign objects in refrigerant circuit Note: Clogging occur in the parts which become below freezing point when water enters in refrigerant circuit.	5. After recovering refrigerant, remove water from entire refrigerant circuit under vacuum more than 1 hour.
		6. In the case of the unit does not restart: Detection temp. of thermistor (TH33) ≧ 95°C	
U3 (5104)	**Open/short circuit of heat pump unit temperature thermistor (TH4, TH33)** Abnormal if open (3°C or less) or short (217°C or more) is detected during compressor operation. (Detection is inoperative for 10 minutes of compressor starting process and for 10 minutes after and during defrosting.) TH4: Thermistor <Discharge> TH33: Thermistor <Comp. surface>	1. Disconnection or contact failure of connectors (TH4, TH33) on the controller circuit board	1. Check connection of connector (TH4, TH33) on the controller circuit board. Check breaking of the lead wire for TH4, TH33.
		2. Defective thermistor	2. Check resistance value of TH4, TH33 or temperature by microprocessor.
		3. Defective controller circuit board	3. Replace controller circuit board.

Code	Error	Cause	Action
U4 (TH3: 5105) (TH7: 5106) (TH8: 5110) (TH32: 5132) (TH34: 5134)	**Open/short of heat pump unit thermistors (TH3, TH32, TH34, TH7 and TH8)** Abnormal if open or short is detected during compressor operation. Open detection of TH3, TH32 and TH34 is inoperative for 10 seconds to 10 minutes after compressor starting. Note: Check which unit has abnormality in its thermistor by switching the mode of SW2. (PAC-SK52ST)	1. Disconnection or contact failure of connectors Controller circuit board: TH3, TH32, TH34, TH7 Power board: CN6 2. Defective thermistor 3. Defective controller circuit board	1. Check connection of connector (TH3, TH32, TH34 TH7) on the controller circuit board. Check connection of connector (CN6) on the power board. Check breaking of the lead wire for TH3, TH32, TH34, TH7, TH8. 2. Check resistance value of TH3, TH32, TH34,TH7,TH8 or check temperature by microprocessor. 3. Replace controller circuit board. Note: Emergency operation is available in case of abnormalities of TH3 and TH7.
U5 (4230)	**Temperature of heat sink** Abnormal if TH8 detects temperature indicated 95°C. TH8: Thermistor <Heat sink>	1. Rise of ambient temperature 2. Defective thermistor 3. Defective input circuit of power circuit board 4. Failure of brine pump drive circuit	1. Check if there is something which causes temperature rise around unit. (Upper limit of ambient temperature is 35°C.) Turn off power, and on again to check if U5 is displayed within 30 minutes. If U4 is displayed instead of U5, follow the action to be taken for U4. 2. Check resistance value of TH8 or temperature by microprocessor. 3. Replace power circuit board. 4. Replace controller circuit board.
U6 (4250)	**Power module** Check abnormality by driving power module in case overcurrent is detected. (UF or UP error condition)	1. Decrease of power supply voltage 2. Looseness, disconnection or converse of compressor wiring connection 3. Defective compressor 4. Defective controller circuit board	1. Check facility of power supply. 2. Correct the wiring (U•V•W phase) to compressor. 3. Check compressor 4. Replace controller circuit board.
U7 (1520)	**Too low superheat due to low discharge temperature** Abnormal if discharge superheat is continuously detected less than or equal to −15°C for 3 minutes even though linear expansion valve has minimum open pulse after compressor starts operating for 10 minutes.	1. Disconnection or loose connection of discharge temperature thermistor (TH4) 2. Defective holder of discharge temperature thermistor 3. Disconnection or loose connection of linear expansion valve's coil 4. Disconnection or loose connection of linear expansion valve's connector 5. Defective linear expansion valve	1., 2. Check the installation conditions of discharge temperature thermistor (TH4). 3. Check the coil of linear expansion valve. 4. Check the connection or contact of LEV-A on controller circuit board. 5. Check linear expansion valve.
U8 (4400)	**Brine pump** Abnormal if rotational frequency of the brine pump is not detected during DC brine pump operation. Brine pump rotational frequency is abnormal if 500 rpm or below or 5000 rpm or more detected continuously for 1 minute.	1. Failure in the operation of the DC brine pump 2. Failure in the controller circuit board	1. Check or replace the DC brine pump. 2. Check the voltage of the controller circuit board during operation. 3. Replace the controller circuit board. (When the failure is still indicated even after performing the action ① above.)
U9 (4220)	Detailed codes	To find out the details about U9 error, turn ON SW2-1, 2-2, 2-3, 2-4, 2-5 and 2-6 when U9 error occurs. (PAC-SK52ST) To find out the detail history (latest) about U9 error, turn ON SW2-1, 2-2 and 2-6. (PAC-SK52ST) Refer to "9-8. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".	
	01	**Overvoltage error** • Increase in DC bus voltage to 760V	1. Abnormal increase in power source voltage 2. Disconnection of compressor wiring 3. Defective power circuit board 4. Compressor has a ground fault.	1. Check the field facility for the power supply. 2. Correct the wiring (U.V.W phase) to compressor. Refer to "9-8. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS". (Power circuit board). 3. Replace power circuit board. 4. Check compressor for electrical insulation. Replace compressor.
	02	**Undervoltage error** • Instantaneous decrease in DC bus voltage to 350V	1. Decrease in power source voltage, instantaneous stop 2. Defective 52C drive circuit in power circuit board 3. Defective converter circuit board 4. Disconnection or loose connection of rush current protect resistor RS 5. Defective rush current protect resistor RS	1. Check the field facility for the power supply. 2. Replace power circuit board. 3. Replace converter circuit board. 4. Check RS wiring. 5. Replace RS.

Code	Error		Cause	Action
U9 (4220)	Detailed codes 04	**Input current sensor error/ L1-phase open error** • Decrease in input current through heat pump unit to 0.1A only if operation frequency is more than or equal to 40Hz or compressor current is more than or equal to 6A.	1. L1-phase open 2. Disconnection or loose connection between TB1 and noise filter circuit board 3. Disconnection or loose connection of CN5 on the power circuit board/CNCT on the noise filter board 4. Defective ACCT (AC current trans) on the noise filter circuit board 5. Defective input current detection circuit in power circuit board 6. Defective controller circuit board	1. Check the field facility for the power supply. 2. Check the wiring between TB1 and noise filter circuit board. 3. Check CN5/CNCT wiring. 4. Replace noise filter circuit board. 5. Replace power circuit board. 6. Replace controller circuit board.
	08	**Abnormal power synchronous signal** • No input of power synchronous signal to power circuit board • Power synchronous signal of 44 Hz or less, or 65 Hz or more is detected on power circuit board.	1. Distortion of power source voltage, noise superimposition. 2. Disconnection or loose connection of earth wiring 3. Disconnection or loose connection of CN2 on the power circuit board /controller circuit board 4. Defective power synchronous signal circuit in controller circuit board 5. Defective power synchronous signal circuit in power circuit board	1. Check the field facility for the power supply. 2. Check earth wiring. 3. Check CN2 wiring. 4. Replace controller circuit board. 5. Replace power circuit board.
UE (1302)	**Abnormal pressure of 63HS** Abnormal if 63HS detects 0.1 MPa or less. Detection is inoperative for 3 minutes after compressor starting and 3 minutes after and during defrosting. 63HS: High pressure sensor		1. Disconnection or contact failure of connector (63HS) on the controller circuit board 2. Defective pressure sensor 3. Defective controller circuit board	1. Check connection of connector (63HS) on the controller circuit board. Check breaking of the lead wire for 63HS. 2. Check pressure by microprocessor. (Pressure sensor/ 63HS) 3. Replace controller circuit board.
UL (1300)	**Low pressure** Abnormal if TH33-TH4 exceeds 20°C and TH33 exceeds 80°C during compressor operation.		1. Defective linear expansion valve. 2. Defective controller circuit board	1. Check linear expansion valve. 2. Replace controller circuit board.
UF (4100)	**Compressor overcurrent interruption (When compressor locked)** Abnormal if overcurrent of DC bus or compressor is detected within 30 seconds after compressor starts operating.		1. Decrease of power supply voltage 2. Looseness, disconnection or converse of compressor wiring connection 3. Defective compressor 4. Defective power board	1. Check facility of power supply. 2. Correct the wiring (U•V•W phase) to compressor. 3. Check compressor. 4. Replace power circuit board.
UH (5300)	**Current sensor error or input current error** • Abnormal if current sensor detects –1.0A to 1.0A during compressor operation. (This error is ignored in case of test run mode.) • Abnormal if 40A of input current is detected or 37A or more of input current is detected for 10 seconds continuously.		1. Disconnection of compressor wiring 2. Defective circuit of current sensor on power circuit board 3. Decrease of power supply voltage 4. Leakage or shortage of refrigerant	1. Correct the wiring (U•V•W phase) to compressor. 2. Replace power circuit board. 3. Check the facility of power supply. 4. Check leakage of refrigerant.
UA (2511)	**Low brine flow rate (flow switch operated)** Abnormal if flow switch is operated (under 5.5L/min) during compressor operation.		1. Valve of brine circuit is closed during operation. 2. Disconnection or loose connection of connector (63L) on controller circuit board 3. Disconnection or loose connection of 63L 4. Defective controller circuit board 5. Leakage or shortage of brine	1. Check valve. 2. to 4. Turn the power off and on again to check if F3 is displayed on restarting. If F3 is displayed, follow the F3 processing direction. 5. Correct to proper amount of refrigerant.
UP (4210)	**Compressor overcurrent interruption** Abnormal if overcurrent DC bus or compressor is detected after compressor starts operating for 30 seconds.		1. Decrease of power supply voltage 2. Looseness, disconnection or converse of compressor wiring connection 3. Defective pump of heat pump unit 4. Defective input circuit of controller circuit board 5. Defective compressor 6. Defective power circuit board 7. DIP switch setting difference of controller circuit board	1. Check facility of power supply. 2. Correct the wiring (U·V·W phase) to compressor. Refer to "9-7.TEST POINT DIAGRAM" (Power circuit board). 3. Check pump. 4. Replace controller circuit board. Note: Before the replacement of the controller circuit board, disconnect the wiring to compressor from the power circuit board and check the output voltage among phases, U, V, W, during test run. No defect on board if voltage among phases (U-V, V-W and W-U) is same. Make sure to perform the voltage check with same performing frequency. 5. Check compressor. Refer to "9-6. Checking component parts' function". 6. Replace power circuit board. 7. Check the DIP switch setting of controller circuit board.

9-5. Troubleshooting by inferior phenomena

No.	Fault symptom	Possible cause	Explanation - Solution
1	Main remote controller display is blank.	1. There is no power supply to main remote controller.	1. Check LED2 on FTC. (See "5. WIRING DIAGRAM".) (i) When LED2 is lit. Check for damage or contact failure of the main remote controller wiring. (ii) When LED2 is blinking. Refer to No. 5 below. (iii) When LED2 is not lit. Refer to No. 4 below.
		2. Power is supplied to main remote controller, however, the display on the main remote controller does not appear.	2. Check the following: • Disconnection between the main remote controller cable and the FTC control board • Failure of the main remote controller if “Please Wait” is not displayed. • Refer to No. 2 below if “Please Wait” is displayed.
2	“Please Wait” remains displayed on the main remote controller.	1. "Please Wait" is displayed for up to 6 minutes. 2. Communication failure between the main remote controller and FTC 3. Communication failure between FTC and controller circuit board	1. Normal operation 2, 3. Main remote controller start up checks/procedure. (i) If “0%” or “50–99%” is displayed below "Please Wait" there is a communication error between the main remote controller and the FTC control board. • Check wiring connections on the main remote controller. • Replace the main remote controller or the FTC control board. (ii) If “1–49%” is displayed there is a communication error between controller circuit board and FTC control board. • Check the wiring connections on the controller circuit board and the FTC control board. (Ensure the wiring connections between CN1 on the FTC control board and CNS on the controller circuit board) • Replace the controller circuit board and/or the FTC control board.
3	The main screen appears with a press of the “ON” button, but disappears in a second.	The main remote controller operations do not work for a while after the settings are changed in the service menu. This is because the system takes time to apply the changes.	Normal operation The FTC is applying updated settings made in the service menu. Normal operation will start shortly.
4	LED2 on FTC is off. (See "5. WIRING DIAGRAM".)	When LED1 on FTC is also off. (See "5. WIRING DIAGRAM".)	
		1. The controller circuit board unit is not supplied at the rated voltage.	1. Check the voltage across the terminals L and N or L3 and N on the controller circuit board (See "6. FIELD WIRING".) • When the voltage is not 220 to 240 V AC, check wiring of the unit and of the breaker. • When the voltage is at 220 to 240 V AC, go to “2.” below. • Check the N.F.board and TB1 cable.
		2. Faulty connector wiring	2. • Check the cable between the terminals and N.F. board • Check the cable between CNAC1 of the N.F.board and CNAC of the controller circuit board. • Check the cable between CN01 of the FTC board and CNS of the controller circuit board.
		3. FTC failure	3. Check the FTC control board. • Check the fuse on FTC control board. • Check for faulty wiring. • If no problem found with the wiring, the FTC control board is faulty.
		When LED1 on FTC is lit. Incorrect setting of refrigerant address. (None of the refrigerant address is set to "0".)	Set the refrigerant address to “0”. (Set refrigerant address using SW1(3-6) on controller circuit board.)
5	LED2 on FTC is blinking. (See "5. WIRING DIAGRAM".)	When LED1 is also blinking on FTC . Faulty wiring between FTC and controller circuit board	Check for faulty wiring between FTC and controller circuit board.
		When LED1 on FTC is lit.	
		1. Short-circuited wiring in main remote controller	1., 2. Remove main remote controller wires and check LED2 on FTC. (See "5. WIRING DIAGRAM".) • If LED2 is blinking check for short circuits in the main remote controller wiring. • If LED2 is lit, wire the main remote controller again and: - if LED2 is blinking, the main remote controller is faulty; - if LED2 is lit, faulty wiring of the main remote controller has been corrected.
		2. Main remote controller failure	
6	LED4 on FTC is off. (See "5. WIRING DIAGRAM".)	1. SD memory card is NOT inserted into the memory card slot with correct orientation.	1. Correctly insert SD memory card in place until a click is heard.
		2. Not an SD standards compliant memory card.	2. Use an SD standards compliant memory card. (Refer to installation manual, "5.1.8 Using SD memory card".)
	LED4 on FTC is blinking. (See "5. WIRING DIAGRAM".)	1. Full of data. 2. Write-protected. 3. NOT formatted. 4. Formatted in NTFS file system.	1. Move or delete data, or replace SD memory card with a new one. 2. Release the write-protect switch. 3. Refer to installation manual, "5.1.8 Using SD memory card". 4. FTC control board is Not compatible with NTFS file system. Use an SD memory card formatted in FAT file system.

No.	Fault symptom	Possible cause	Explanation - Solution
7	No water at hot tap.	1. Cold main off 2. Strainer (local supply) blocked.	1. Check and open stop cock. 2. Isolate water supply and clean strainer.
8	Cold water at tap.	1. Hot water run out. 2. Prohibit, schedule timer or holiday mode selected or demand control input (IN4) or smart grid ready (switch-off command). 3. Heat pump not working. 4. Booster heater cut-out tripped. 5. The earth leakage circuit breaker for booster heater breaker (ECB1) tripped. 6. The booster heater thermal cut-out has tripped and cannot be reset using the manual reset button. 7. Immersion heater cut-out tripped. 8. Immersion heater breaker (ECB2) tripped. 9. 3-way valve fault	1. Ensure DHW mode is operating and wait for DHW tank to re-heat. 2. Check settings and change as appropriate. 3. Check heat pump. 4. Check booster heater thermostat and press reset button if safe. Reset button is located on the side of booster heater, covered with white rubber cap. See "3. PART NAMES AND FUNCTIONS" to find out its position. 5. Check the cause and reset if safe. 6. Check resistance across the thermal cut-out, if open then the connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer. 7. Check immersion heater thermostat and press reset button, located on immersion heater boss, if safe. If the heater has been operated with no water inside it may have failed, so please replace it with a new one. 8. Check the cause and reset if safe. 9. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu") If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve coil. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to "10. DISASSEMBLY PROCEDURE".)
9	Water heating takes longer.	1. Heat pump not working. 2. Booster heater cut-out tripped. 3. Booster heater breaker (ECB1) tripped. 4. The booster heater thermal cut-out has tripped and cannot be reset using the manual reset button. 5. Immersion heater cut-out has been triggered. 6. Immersion heater breaker (ECB2) tripped. 7. Flow rate of the sanitary circuit may be reduced.	1. Check heat pump. 2. Check booster heater thermostat and press reset button if safe. Reset button is located on the side of booster heater, covered with white rubber cap. See "3. PART NAMES AND FUNCTIONS" to find out its position. 3. Check the cause and reset if safe. 4. Check resistance across the thermal cut-out, if open then connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer. 5. Check immersion heater thermostat and press reset button located on immersion heater boss, if safe. If the heater kept running with no water inside, this may have resulted in failure, so replace it with a new one. 6. Check the cause and reset if safe. 7. Check the following items • Check for trapped air in water pump (sanitary circuit). • Check if the speed of water pump (sanitary circuit) is set to 2. • Check water pump (sanitary circuit) for malfunction. (Refer to "9-6. Checking Component Parts' Function".) • Replace plate heat exchanger (water - water) or scale trap, if there are a blockage which blocks the sanitary circuit.
10	Temperature of DHW tank water dropped.	When DHW operation is not running, the DHW tank emits heat and the water temperature decreases to a certain level. If water in the DHW tank is reheated frequently because of a significant drop in water temperature, check for the following. 1. Water leakage in the pipes that connect to the DHW tank 2. Insulation material coming loose or off. 3. 3-way valve failure 4. Water pump (sanitary circuit) speed setting failure	1. Take the following measures. • Retighten the nuts holding the pipes onto the DHW tank. • Replace seal materials. • Replace the pipes. 2. Fix insulation. 3. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu".) If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve motor. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to "10. DISASSEMBLY PROCEDURE".) 4. Water pump (sanitary circuit) MUST be set to speed 2. When it set to speed 1, hot water would be mixed with cold water due to circulation.
11	Hot or warm water from cold tap.	Heat of hot water pipe is transferred to cold water pipe.	Insulate/re-route pipework.
12	Water leakage	1. Poorly sealed connections of water circuit components 2. Water circuit components reaching the end of life	1. Tighten connections as required. 2. Refer to PARTS CATALOG for expected part lifetimes and replace them as necessary.

No.	Fault symptom	Possible cause	Explanation - Solution
13	Heating system does not reach the set temperature.	1. Prohibit, schedule timer or holiday mode selected or demand control input (IN4) or smart grid ready (switch-off command).	1. Check settings and change as appropriate.
		2. Check settings and change as appropriate.	2. Check the battery power and replace if flat.
		3. The temperature sensor is located in a room that has a different temperature relative to that of the rest of the house.	3. Relocate the temperature sensor to a more suitable room.
		4. Heat pump not working.	4. Check heat pump.
		5. Booster heater cut-out tripped.	5. Check booster heater thermostat and press reset button if safe. Reset button is located on the side of booster heater, covered with white rubber cap. (See "3. PART NAMES AND FUNCTIONS" for position.)
		6. Booster heater breaker (ECB1) tripped.	6. Check the cause of the trip and reset if safe.
		7. The booster heater thermal cut-out tripped and cannot be reset using the manual reset button.	7. Check resistance across the thermal cut-out, if open then the connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer.
		8. Incorrectly sized heat emitter.	8. Check the heat emitter surface area is adequate Increase size if necessary.
		9. 3-way valve failure	9. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu".) If the 3-way valve does not function, go to (ii) below. (ii) Replace 3-way valve motor. If the 3-way valve coil is replaced but the 3-way valve does not function go to (iii) below. (iii) Replace 3-way valve. (Refer to "10. DISASSEMBLY PROCEDURE".)
		10. Battery problem (wireless control only)	10. Check the battery power and replace if flat.
		11. If a mixing tank is installed, the flow rate between the mixing tank and the unit is less than that between the mixing tank and the local system.	11. Increase the flow rate between the mixing tank and the unit decrease that between the mixing tank and the local system.
14	In 2-zone temperature control, only Zone2 does not reach the set temperature.	1. When Zone1 and Zone2 are both in heating mode, the hot water temperature in Zone2 does not exceed that in Zone1.	1. Normal action no action necessary.
		2. Faulty wiring of motorized mixing valve	2. Refer to installation manual, "5.3 Wiring for 2-zone temperature control".
		3. Faulty installation of motorized mixing valve	3. Check for correct installation. (Refer to the manual included with each motorized mixing valve.)
		4. Incorrect setting of Running time	4. Check for correct setting of Running time.
		5. Motorized mixing valve failure	5. Inspect the mixing valve. (Refer to the manual included with each motorized mixing valve.)
15	After DHW operation room temperature rises slightly.	At the end of the DHW mode operation the 3-way valve diverts hot water away from the DHW circuit into space heating circuit. This is done to prevent the unit components from overheating. The amount of hot water directed into the space heating circuit varies according to the type of the system and of the pipe run between the plate heat exchanger and the unit.	Normal operation no action necessary.
16	The room temperature rises during DHW operation.	3-way valve failure	Check the 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in "8-5. Service menu".) If the 3-way valve does not function, go to (ii) below. (ii) Replace 3-way valve coil. If the 3-way valve coil is replaced but the 3-way valve does not function go to (iii) below. (iii) Replace 3-way valve. (Refer to "10. DISASSEMBLY PROCEDURE".)
17	Water discharges from pressure relief valve. (Primary circuit)	1. If continual – pressure relief valve could bite foreign objects and the valve seat may be damaged.	1. Turn the handle on the pressure relief valve several turns. If leakage persists, replace the pressure relief valve with a new one.
		2. If intermittent – expansion vessel charge may have reduced/bladder perished.	2. Check pressure in expansion vessel. Recharge to 1 bar if necessary. If bladder perished replace expansion vessel with a new one.
18	Water discharges from pressure relief valve. (Sanitary circuit)	1. If continual – field supplied pressure reducing valve not working.	1. Check function of pressure reducing valve and replace if necessary.
		2. If continual – pressure relief valve could bite foreign objects and the valve seat may be damaged.	2. Turn the handle on the pressure relief valve several turns. If leakage persists, replace the pressure relief valve with a new one.
		3. If intermittent – expansion vessel charge may have reduced/bladder perished.	3. Check gas-side pressure in expansion vessel. Recharge to correct precharge pressure if necessary. If bladder perished replace expansion vessel with a new one with appropriate pre-charge.
		4. DHW tank may have subjected to backflow.	4. Check the pressure in DHW tank. If pressure in DHW tank is similar to that in the incoming mains, cold water supply that merges with incoming mains water supply could flow back to DHW tank. Investigate source of back-feed and rectify error in pipework/fitting configuration. Adjust pressure in cold supply.
19	Noisy water circulation pump	Air in water circulation pump.	Use manual and automatic air vents to remove air from system. Top up water if necessary to achieve 1 bar on primary circuit.

<table>
<tr><th>No.</th><th>Fault symptom</th><th>Possible cause</th><th>Explanation - Solution</th></tr>
<tr><td>20</td><td>Noise during hot water draw off typically worse in the morning.</td><td>1. Loose airing cupboard pipework.
2. Heaters switching on/off.</td><td>1. Install extra pipe fastening clips.
2. Normal operation no action necessary.</td></tr>
<tr><td>21</td><td>Mechanical noise heard coming from the unit.</td><td>1. Heaters switching on/off.
2. 3-way valve changing position between DHW and heating mode.
3. Heat pump unit (compressor) running</td><td>Normal operation no action necessary.</td></tr>
<tr><td>22</td><td>Water circulation pump runs for a short time unexpectedly.</td><td>Water circulation pump jam prevention mechanism (routine) to inhibit the build-up of scale.</td><td>Normal operation no action necessary.</td></tr>
<tr><td>23</td><td>Milky/Cloudy water (Sanitary circuit)</td><td>Oxygenated water</td><td>Water from any pressurised system will release oxygen bubbles when water is running. The bubbles will settle out.</td></tr>
<tr><td>24</td><td>Heating mode has been on standby for a long time (does not start operation smoothly.)</td><td>The time of “Delay” set in “Economy settings for pump” is too short. (Go to “Service menu” → “Auxiliary settings” → “Economy settings for pump”).</td><td>Increase the time of “Delay” in “Economy settings for pump” .</td></tr>
<tr><td>25</td><td>The heat pump unit that was running in the heating mode before power failure is running in the DHW mode after power recovery.</td><td>The heat pump unit is designed to run in an operation mode with a higher priority (i.e. DHW mode in this case) at power recovery.</td><td>• Normal operation.
• After the DHW max. operation time has elapsed or the DHW max. temperature has been reached, the DHW mode switches to the other mode (ex. Heating mode).</td></tr>
<tr><td rowspan="4">26</td><td rowspan="4">The energy monitor value seems not correct.

Note:
There could be some discrepancies between the actual and the calculated values.
If you seek for accuracy, please make sure to connect power meter(s) and heat meter to FTC board. Both should be locally supplied.</td><td>1. Incorrect setting of the energy monitor</td><td>1. Check the setting by following the procedure below.
(1) Check if the DIP switch on FTC board is set as the table below.
Consumed electric energy
<table><tr><td>SW3-4</td><td>Electric energy meter (Local supply)</td></tr><tr><td>OFF</td><td>Without</td></tr><tr><td>ON</td><td>With</td></tr></table>
Delivered heat energy
<table><tr><td>SW3-8</td><td>Heat meter (Local supply)</td></tr><tr><td>OFF</td><td>Without</td></tr><tr><td>ON</td><td>With</td></tr></table>
(2) In the case external electric energy meter and/or heat meter is not used, check if the setting for electric heater and water pump(s) input is correct by referring to <Energy monitor setting> in "8-5. Service menu".
(3) In the case external electric energy meter and/or heat meter is used, check if the unit of output pulse on external meter matches with the one set at the main remote controller by referring to <Energy monitor setting> in "8-4. Service menu".</td></tr>
<tr><td>2. Non-connectable type of external meter (local supply) is connected.</td><td>2. Check if the external meter (local supply) is connectable type by referring to <Energy monitor setting>" in "8-5. Service menu".</td></tr>
<tr><td>3. External meter (local supply) failure</td><td>3. Check if signal is sent to IN8 to IN10 properly. (Refer to section 5. WIRING DIAGRAM)
Replace the external heat meter if defective.</td></tr>
<tr><td>4. FTC board failure</td><td>4. Check the FTC control board.
• Check for faulty wiring.
• If no problem found with the wiring, the FTC control board is faulty. Replace the board.</td></tr>
<tr><td>27</td><td>Heat pump is forced to turn ON and OFF.</td><td>Smart grid ready input (IN11 and IN12) is used, and switch-on and off commands are input.</td><td>Normal operation no action necessary.</td></tr>
</table>

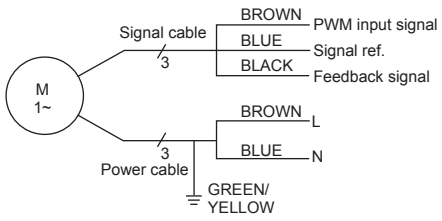
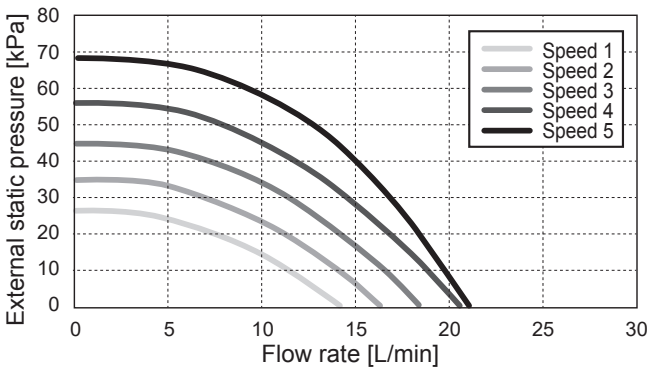
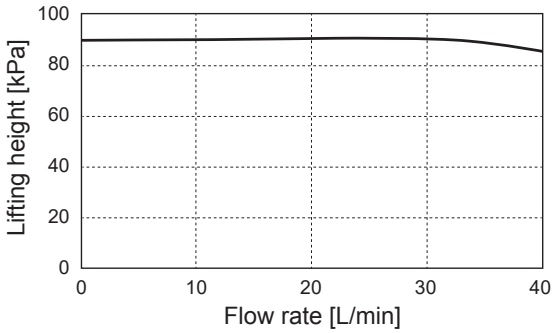
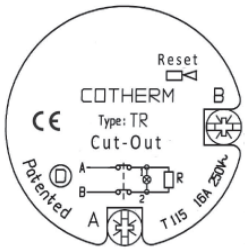
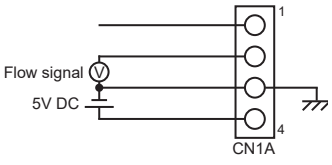
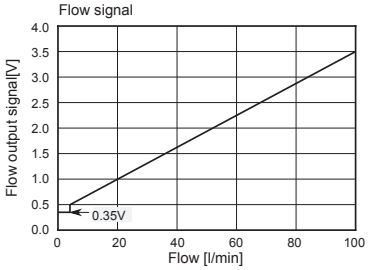
Annual Maintenance

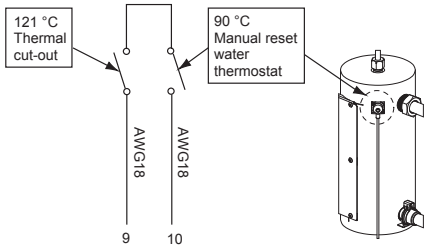
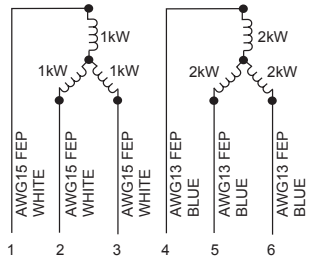
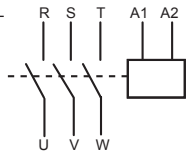
It is essential that the heat pump unit is serviced at least once a year by a qualified individual. Any spare parts required should be purchased from Mitsubishi Electric. NEVER bypass safety devices or operate the unit without them being fully operational.

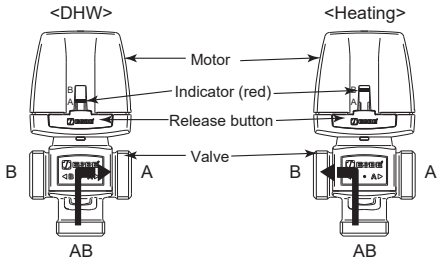
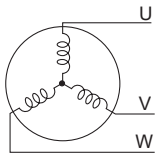
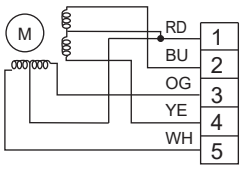
<Annual maintenance points>

Use the Annual Maintenance Log Book as a guide to carrying out the necessary checks on the heat pump unit.

9-6. Checking component parts' function

Part Name	Checkpoints
Water circulation pump (primary circuit) 	**<Water circulation pump (primary circuit) characteristics>**  **Brine Circulation Pump Characteristics** 
<Recommended water flow rate range> Heat pump unit: EHGT17D-YM9ED Water flow rate range [L/min]: 7.1-27.7	
Water circulation pump (sanitary circuit) 	Measure the resistance between the terminals with a tester. (Winding temperate 20°C) Terminal: L-N; Normal (speed 2): 211 Ω; Abnormal: Open or Short DHW circulation pump MUST be set to speed 2.
Immersion heater 	Measure the resistance between the terminals with a tester. (Winding temperate 20°C) Terminal: A-B; Normal: 19.2 Ω; Abnormal: Open or Short To reset the immersion heater use a pin or similar to press the reset button located on the top of the immersion boss. See diagram on the left.
Flow sensor 	

Part Name	Checkpoints
Booster heater	Measure the resistance between the terminals with a tester.
Thermostat (90°C) and thermal cut out (121°C) 	<table><tr><th>Terminal</th><th>Normal</th><th>Abnormal</th></tr><tr><td>9–10</td><td>110(±35) mΩ</td><td>Open or Short</td></tr></table>
3 + 6 kW heater (400 V, 3 phase) 	<table><tr><th>Terminal</th><th>Normal</th><th>Abnormal</th></tr><tr><td>1−2=2-3=1−3</td><td>105.8(+11.8/−5) Ω</td><td>Open or Short</td></tr><tr><td>4−5=5-6=4−6</td><td>52.9(+5.8/−2.5) Ω</td><td>Open or Short</td></tr></table>
Earth leakage circuit breaker for heater	If a short circuit occurs on the booster heater, immersion heater, or each power line, a short-circuit breaker will trip and power source will be blocked. Eliminate the causes of short circuit and then turn on the breaker again.
Relay for heater 	When the applied voltage is not 230 V AC across the terminals A1-A2, check the terminals R-U, S-V, and T-W are open. When the applied voltage is 230 V AC across the terminals A1-A2, check the terminals R-U, S-V, and T-W are short.

Part Name	Checkpoints
3-way valve 	(1) Check the movement of the red indicator. The red indicator normally points to A in DHW mode and to B in Heating mode as shown to the left. (2) If each indicator position is correct but the 3-way valve does not work properly, the motor may not fit onto the valve securely, so remove the motor by pressing the release button, and reinstall it.
Thermistors Thermistor (TH3) <Liquid> Thermistor (TH4) <Discharge> Thermistor (TH7) <Ambient> Thermistor (TH8) <Heat sink> Thermistor (TH32) <Brine inlet> Thermistor (TH33) <Comp. surface> Thermistor (TH34) <Brine outlet>	Disconnect the connector then measure the resistance with a tester. (At ambient temperatures of 10–30°C.)
Brine pump (MBP1)	Refer to the next page.
Motor for compressor (MC) 	Measure the resistance between the terminals with a tester. (Winding temperature 20°C)
Linear expansion valve (LEV-A) 	Disconnect the connector then measure the resistance with a tester. (Winding temperature 20°C)

Thermistor	Normal	Abnormal
TH1	4.3 – 9.5 kΩ	Open or short
TH2		
TH3	4.3 – 9.6 kΩ	
TH4	160 – 410 kΩ	
TH7	4.3 – 9.6 kΩ	
TH8	39 – 105 kΩ	
TH32	4.3 – 9.6 kΩ	
TH33		
TH34		
THW1	4.3 – 9.5 kΩ	
THW2		
THW5		
THW6		
THW7		
THW8		
THW9		
THWB1	40 – 100 kΩ	

EHGT17D-YM9ED	Abnormal
1.65	Open or short

Normal				Abnormal
Red - White	Red - Orange	Red - Yellow	Red - Blue	Open or short
46 ± 4 Ω				

Check method of DC brine pump (brine pump/Controller circuit board)

① Notes
- · High voltage is applied to the connector (CNF1) for the brine pump. Pay attention to the service.
- · Do not pull out the connector (CNF1) for the motor with the power supply on.
  (It causes trouble of the controller circuit board and brine pump.)

Self check

② Symptom: The brine pump cannot rotate.

Fuse check
Check the fuse (F5) on controller circuit board

Did the fuse blow? → Yes → Replace controller board (C.B) and brine pump (MBP1).

↓ No

Wiring contact check
Contact of brine pump connector (CNF1).

Is there contact failure?

↓ No

Brine pump check (CNF1)

UNIT	EHGT17D-YM9ED
Brine pump	BH56N077
Measuring points	Resistance
pin1–pin4	∞
pin5–pin4	1.6 MΩ
pin6–pin4	37 kΩ
pin7–pin4	∞

Is the resistance abnormal? → Yes → Replace the brine pump.

↓ No

Power supply check (Remove the connector (CNF1))
Measure the voltage in the controller circuit board
TEST POINT ① : VDC (between 1 (+) and 4 (−) of the brine pump connector): VDC 280–380 V DC
TEST POINT ② : VCC (between 5 (+) and 4 (−) of the brine pump connector): VCC 15 V DC

Is the voltage normal? → Yes → Replace the brine pump.

↓ No

Replace controller circuit board

↓

Check the operation. → OK → END

↓ Fail

Replace the brine pump.

↓ Yes

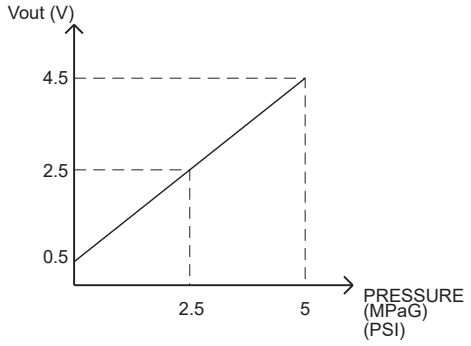
Check the operation of brine pump. → OK → END

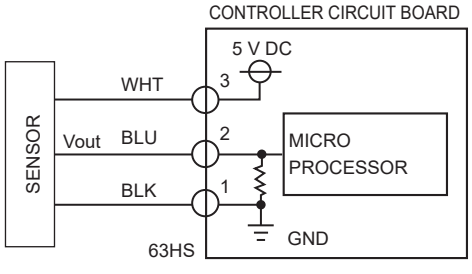
↓ Fail

Replace the controller circuit board

HOW TO CHECK THE COMPONENTS

<HIGH PRESSURE SENSOR>





③-① : 5 V (DC)
②-① : Output Vout (DC)

<Thermistor Characteristics Charts>

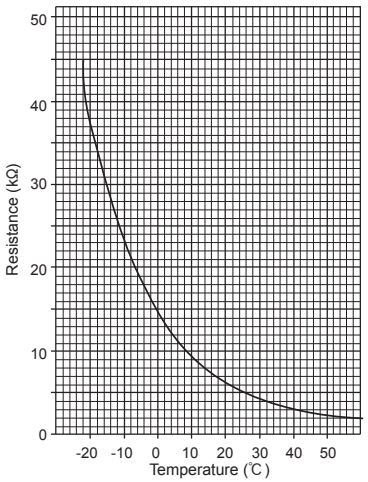
Low temperature thermistors

- Room temperature thermistor (TH1)
- Liquid refrigerant temperature thermistor (TH2)
- Liquid thermistor (TH3)
- Ambient thermistor (TH7)
- Flow water temperature thermistor (THW1)
- Return water temperature thermistor (THW2)
- DHW tank temperature thermistor (THW5A/B)
- Zone1 flow water temperature thermistor (THW6)
- Zone1 return water temperature thermistor (THW7)
- Zone2 flow water temperature thermistor (THW8)
- Zone2 return water temperature thermistor (THW9)
- Brine inlet thermistor (TH32)
- Brine outlet thermistor (TH34)

Thermistor R0 = 15kΩ ± 3%
B constant = 3480 ± 1%

$$Rt = 15\exp\{3480\,(\frac{1}{273+t} - \frac{1}{273})\}$$

0°C	15 kΩ
10°C	9.6 kΩ
20°C	6.3 kΩ
25°C	5.2 kΩ
30°C	4.3 kΩ
40°C	3.0 kΩ



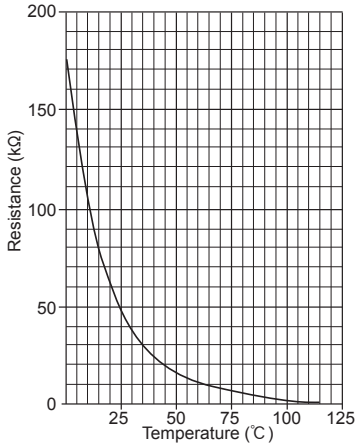
Medium temperature thermistor

- Thermistor <Heat sink> (TH8)

Thermistor R50 = 17 kΩ ± 2 %
B constant = 4150 ± 3 %

$$Rt = 17\exp\{4150(\frac{1}{273+t} - \frac{1}{323})\}$$

0 ℃	180 kΩ
25 ℃	50 kΩ
50 ℃	17 kΩ
70 ℃	8 kΩ
90 ℃	4 kΩ



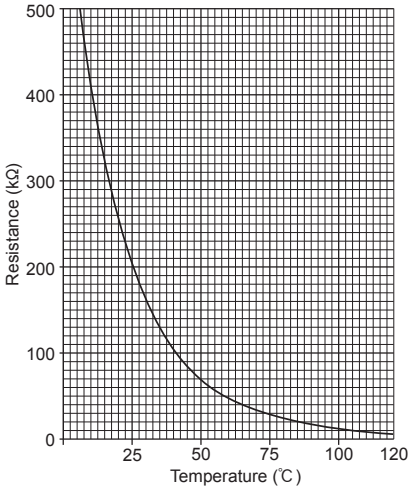
High temperature thermistor

- Discharge thermistor (TH4)
- Comp. surface thermistor (TH33)

Thermistor R120 = 7.465 kΩ ± 2 %
B constant = 4057 ± 2 %

$$Rt = 7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{393})\}$$

20 ℃	250 kΩ	70 ℃	34 kΩ
30 ℃	160 kΩ	80 ℃	24 kΩ
40 ℃	104 kΩ	90 ℃	17.5 kΩ
50 ℃	70 kΩ	100 ℃	13.0 kΩ
60 ℃	48 kΩ	110 ℃	9.8 kΩ

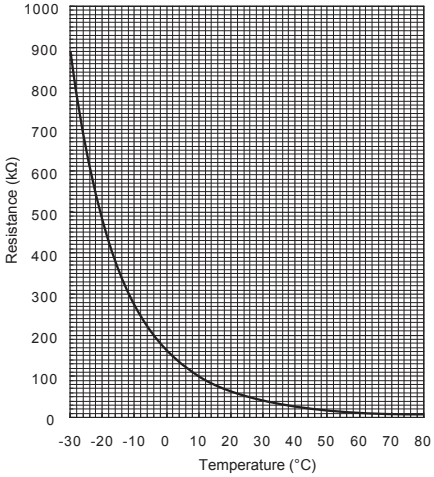


- Boiler flow water temperature thermistor (THWB1)
- Mixing tank water temperature thermistor (THW10)

Thermistor R100 = 3.3kΩ ± 2%
B constant = 3970 ± 1%

$$Rt = 3.3\exp\{3970\,(\frac{1}{273+t} - \frac{1}{273})\}$$

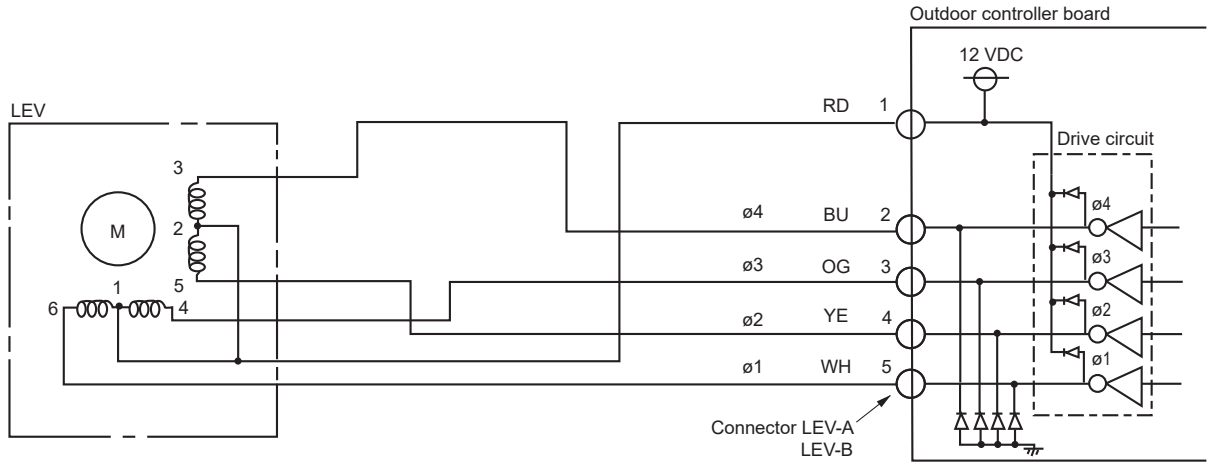
0°C	162.8 kΩ
10°C	97.4 kΩ
20°C	60.3 kΩ
25°C	48.1 kΩ
30°C	38.6 kΩ
40°C	25.4 kΩ
50°C	17.1 kΩ
60°C	11.9 kΩ
70°C	8.4 kΩ
80°C	6.0 kΩ



Linear expansion valve

(1) Operation summary of the linear expansion valve

• Linear expansion valve opens/closes through stepping motor after receiving the pulse signal from the outdoor controller board.
• Valve position can be changed in proportion to the number of pulse signal.
<Connection between the outdoor controller board and the linear expansion valve>



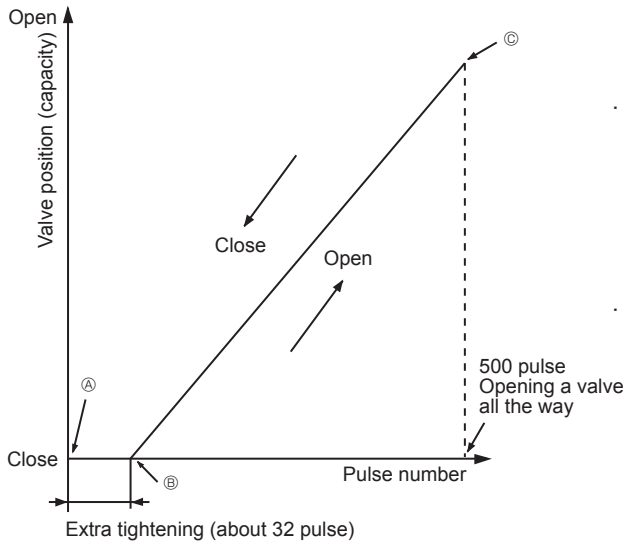
<Output pulse signal and the valve operation>

Output (Phase)	Output							
	1	2	3	4	5	6	7	8
ø1	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
ø2	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
ø3	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
ø4	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

The output pulse shifts in the following order.
Opening a valve: 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8
Closing a valve: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1

· When linear expansion valve operation stops, all output phases become OFF.

(2) Linear expansion valve operation



· When the power is turned on, 700 pulse closing valve signal will be sent till it goes to Ⓐ point in order to define the valve position. (The pulse signal is being sent for about 20 seconds.)

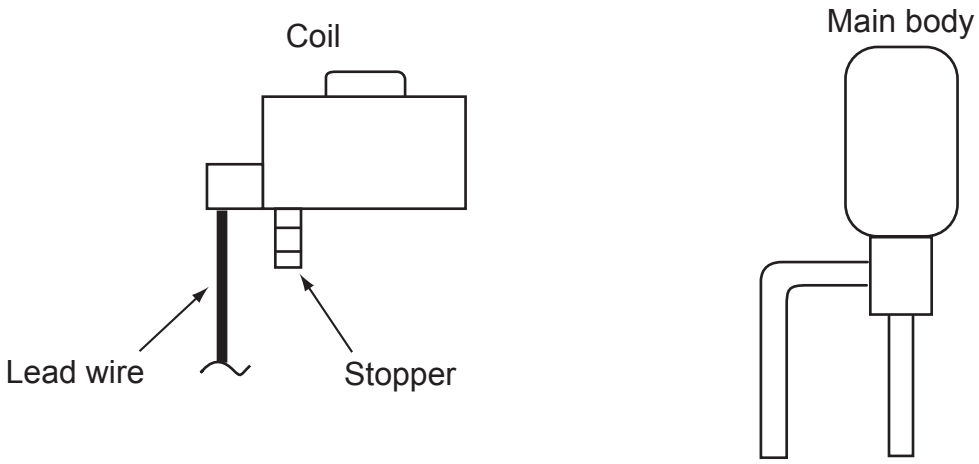
· When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valve : however, when the pulse number moves from Ⓑ to Ⓐ or when the valve is locked, more sound can be heard.
No sound is heard when the pulse number moves from Ⓑ to Ⓐ in case coil is burnt out or motor is locked by open-phase.

· Sound can be detected by placing the ear against the screw driver handle while putting the screw driver to the linear expansion valve.

(3) How to attach and detach the coil of linear expansion valve

<Composition>

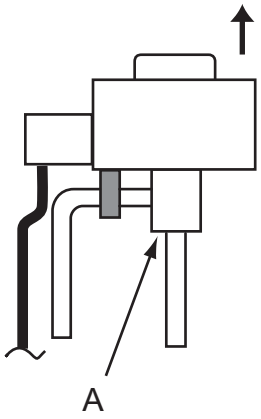
Linear expansion valve is separable into the main body and the coil as shown in the diagrams below.



<How to detach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and detach the coil by pulling it upward.

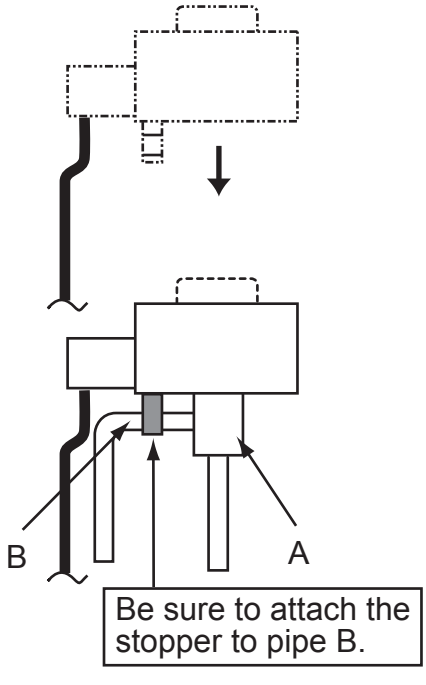
Be sure to detach the coil holding main body firmly. Otherwise pipes can bend due to stress.



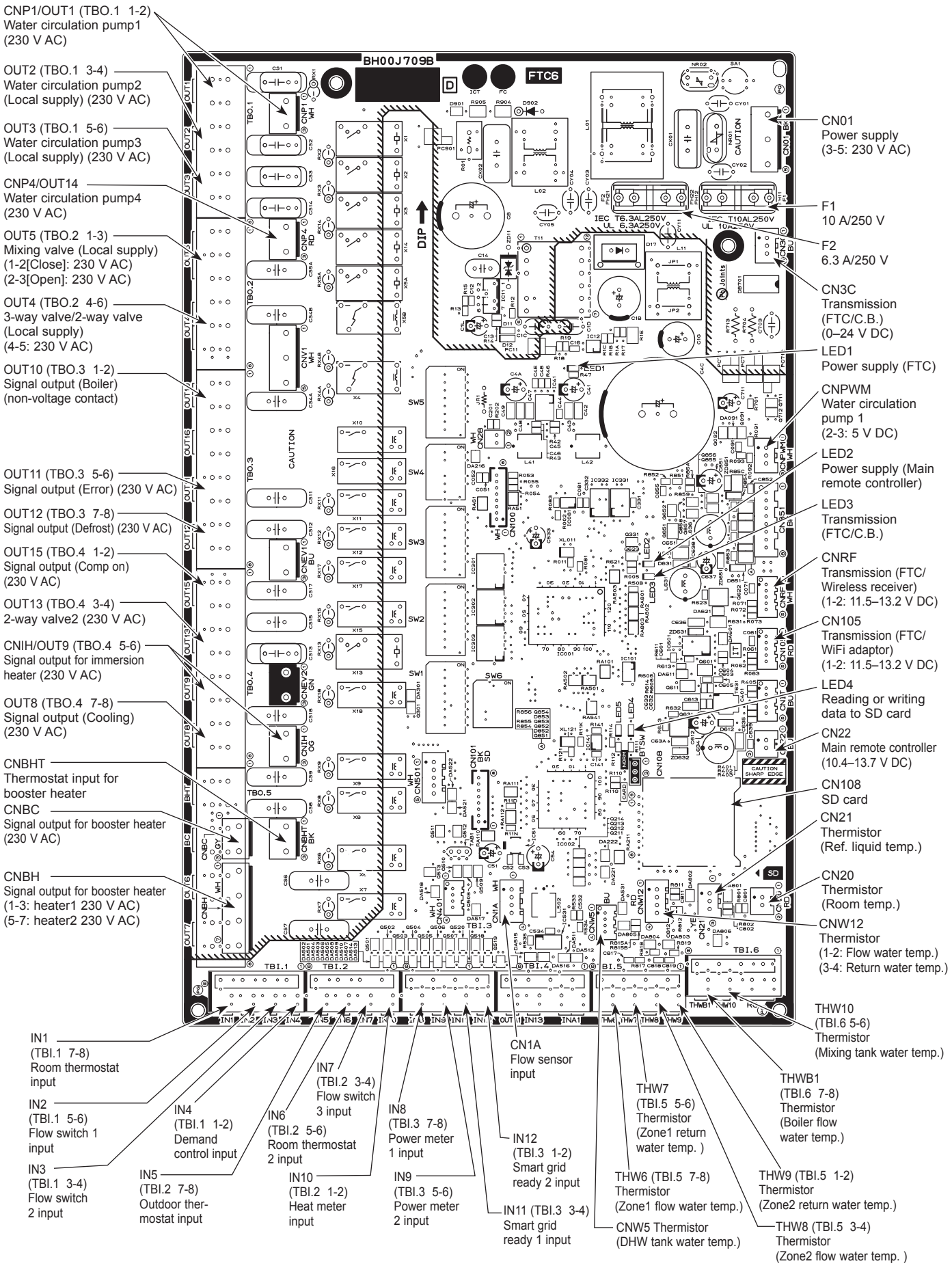
<How to attach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and attach the coil by inserting it downward into the main body. Then securely attach the coil stopper to pipe B. (At this time, be careful that stress is not added to lead wire and main body is not wound by lead wire.) If the stopper is not firmly attached to pipe B, coil may be detached from the main body and that can cause defective operation of linear expansion valve.

To prevent piping stress, be sure to attach the coil holding the main body of linear expansion valve firmly. Otherwise pipe may break.

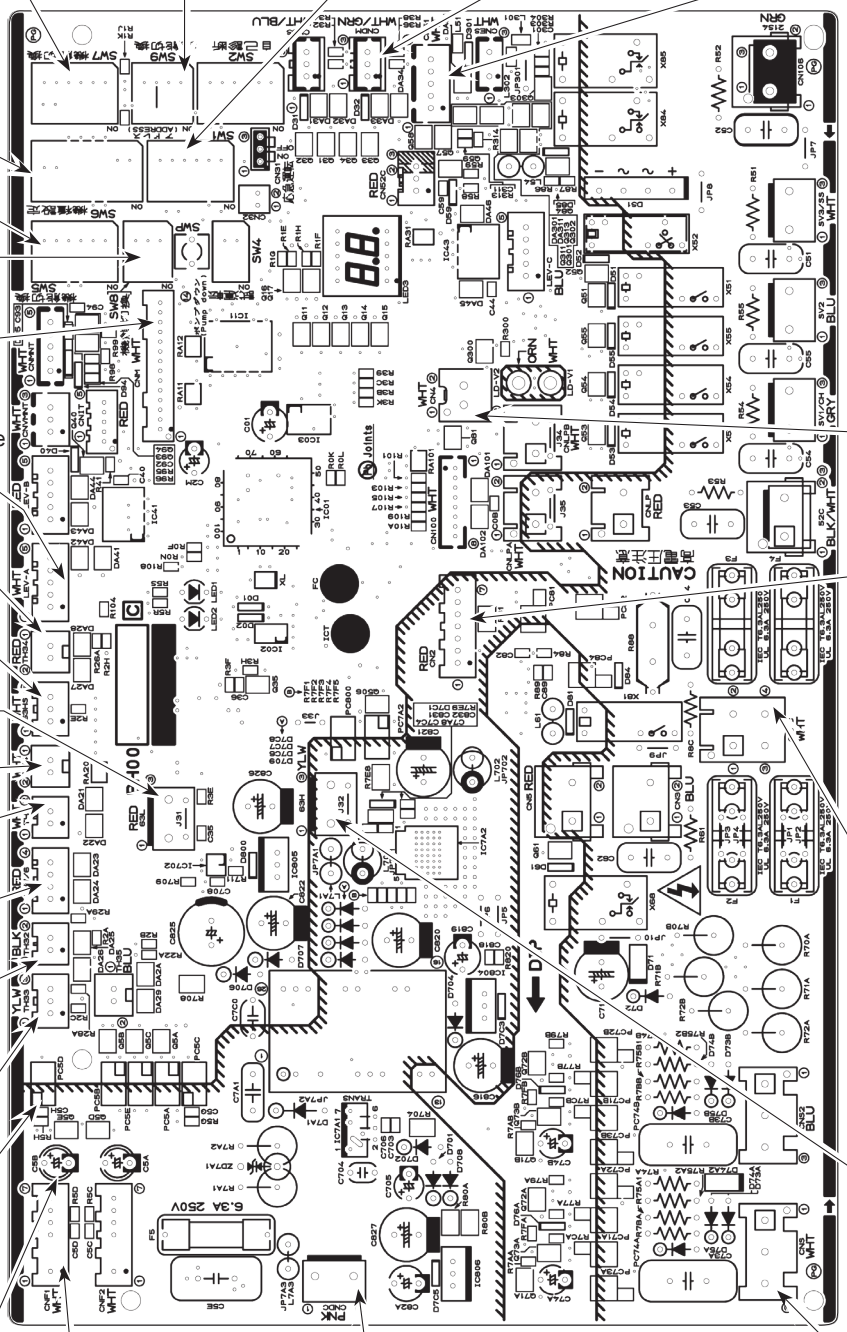


9-7. Test point diagram
FTC (Controller board)



Controller circuit board

<CAUTION> TEST POINT① is high voltage.



SW7
Function switch

SW9
Function switch

SW1
Abnormal history clear

CNDM
①–②:
Input of low-level sound priority mode
①–③:
Input of external contact point

CN51
External signal output
• Compressor operating signal
• Abnormal signal

SW6
Model select

SW5
Function switch

SW8
Function switch

CNM
Connect to A control service tool

LEV-A
Linear expansion valve

CN4
Transmission to the power circuit board (CN4)

TH34
Thermistor
<Brine Outlet>

CN2
Connect to the power circuit board (CN2)
①–⑤: Reception from power circuit board
②–⑤: Zero cross signal (0–5 V DC)
③–④: Not used
⑥–⑤: 15 V DC
⑦–⑤: 15 V DC

63HS
Pressure sensor

63L
Flow switch

TH4
Thermistor
<Discharge>

TH3
Thermistor
<Liquid>

TH7/6
Thermistor
<Ambient>

CNAC
②–④:
Connect to the noise filter circuit board (CNAC1,CNAC2)
Power supply for zero cross signal circuit (230 V AC)
①–③:
Power supply for FTC circuit board (230 V AC)

TH32
Thermistor
<Brine Inlet>

TH33
Thermistor
<Comp. Surface>

63H
High pressure switch

V_{FG}
(Voltage between right pins of PC5D, pin 3 and pin 4)
(Same as CNF1⑦(+)–④(−))

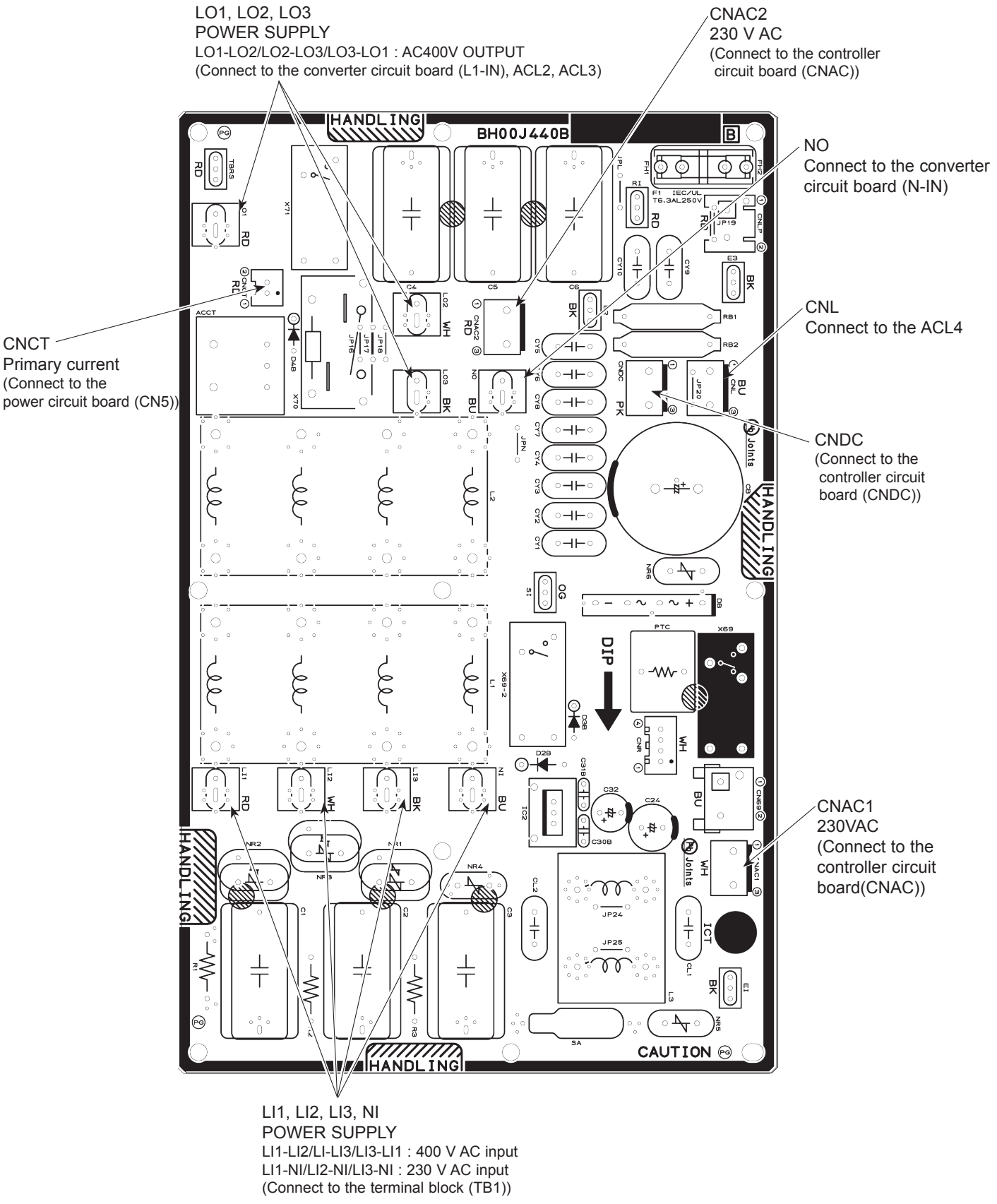
V_{SP}
(Voltage between pins of C5B):
0 V DC(when stopped),
1–6.5 V DC
(when operated)

CNF1
Connect to the Brine pump motor
①–④: 280–380V DC
⑤–④: 15 V DC
⑥–④: 0–6.5V DC
⑦–④: 15 V DC (When stopped)
7.5 V DC (When operated)
(0–15 V pulse)

CNDC
280–380 V DC (①+, ③−)
(Connect to the noise filter circuit board(CNDC))

CNS
Connect to the FTC circuit board(CN01,CN3C)
S1-S2: 230 V AC

Noise filter circuit board

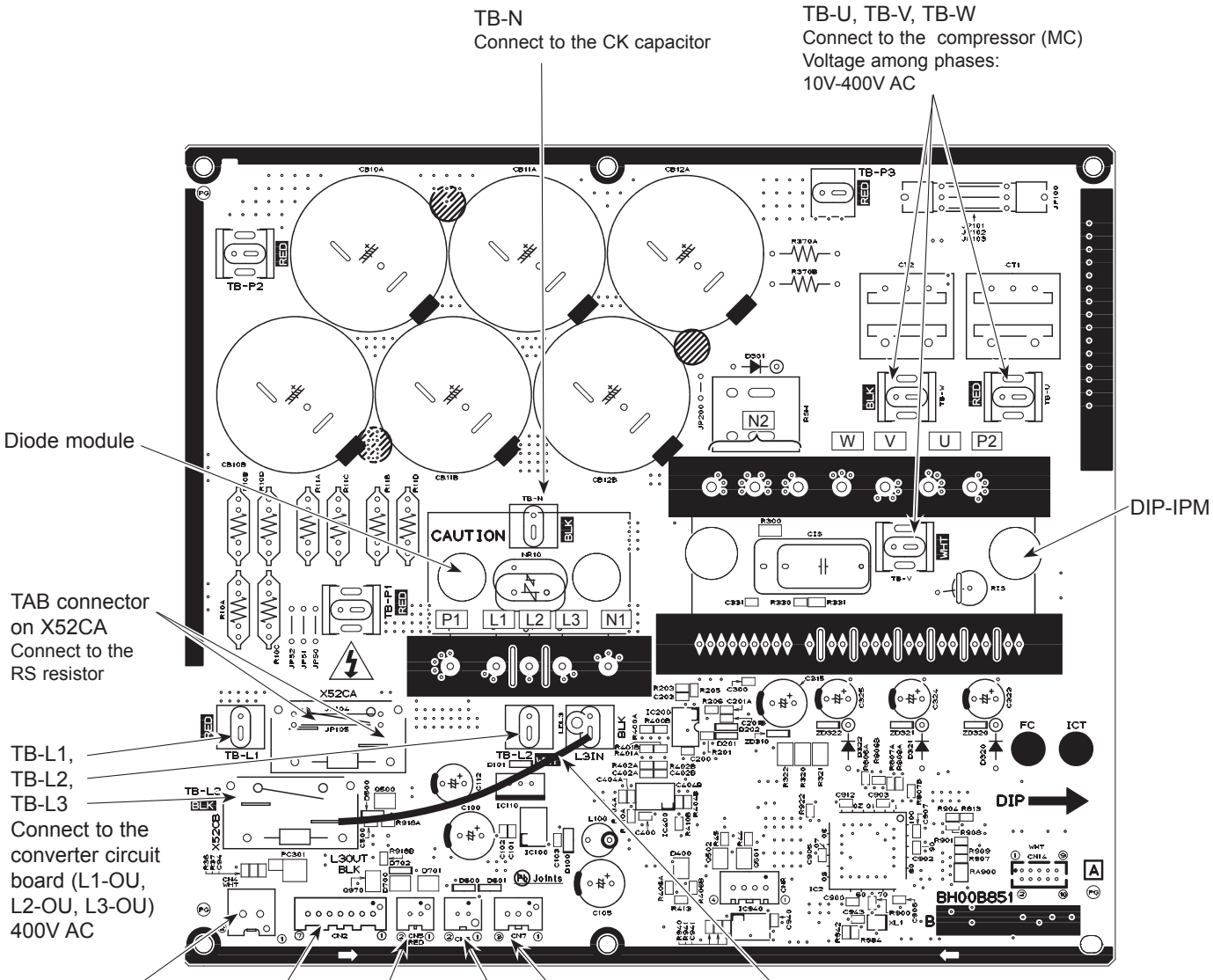


Power circuit board

Brief Check of POWER MODULE
• If they are short-circuited, it means that they are broken.
Measure the resistance in the following points (connectors, etc.).

1. Check of DIODE MODULE
L1-P1, L2-P1, L3-P1, L1-N1, L2-N1, L3-N1
2. Check of DIP-IPM
P2-U, P2-V, P2-W, N2-U, N2-V, N2-W

Note: The marks L1, L2, L3, N1, N2, P1, P2, U, V and W shown in the diagram are not actually printed on the board.



CN4
Connect to the controller circuit board (CN4)

CN5
Detection of primary current (Connect to the noise filter circuit board (CNCT))

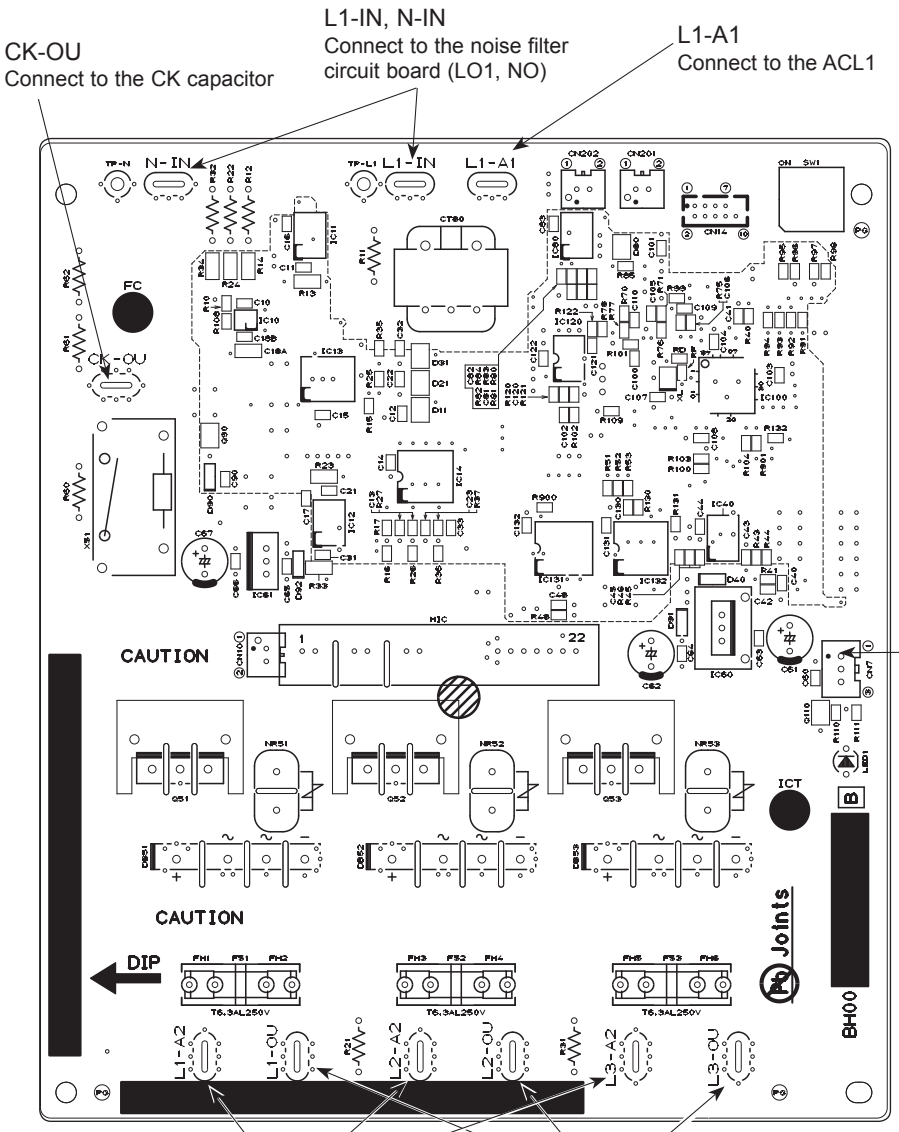
CN7
Connect to the converter circuit board (CN7)

L3OUT-L3IN
Lead connect

CN2
Connect to the controller circuit board (CN2)
①–⑤: Power circuit board → Transmitting signal to the controller board (0–5V DC)
②–⑤: Zero cross signal (0–5 V DC)
③–④: Not used
⑥–⑤: 15 V DC
⑦–⑤: 15 V DC
[⑤ : ⊖ ①, ②, ⑥, ⑦ : ⊕]

CN6
Thermistor
<Heat sink> (TH8)

Converter circuit board

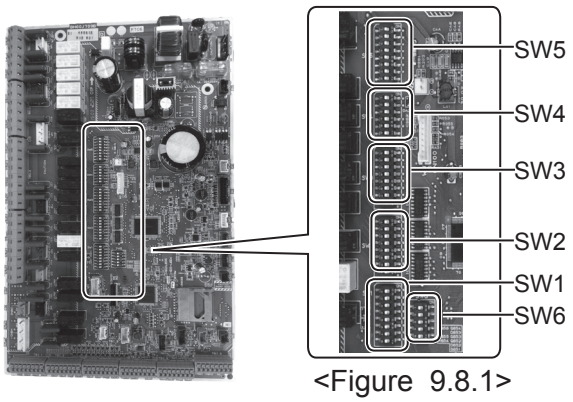


9-8. FUNCTION OF SWITCHES

(1) Function of switches (FTC controller board)

Located on the FTC controller board are 6 sets of small white switches known as DIP switches. The DIP switch number is printed on the circuit board next to the relevant switches. The word ON is printed on the circuit board and on the DIP switch block itself. To move the switch you will need to use a pin or the corner of a thin metal ruler or similar.

DIP switch settings are listed below in Table 9.8.1.
Only an authorised installer can change DIP switch setting under one's own responsibility according to the installation condition.
Make sure to turn off heat pump unit power supplies before changing the switch settings.



<Figure 9.8.1>

DIP switch		Function	OFF	ON	Default settings
SW1	SW1-1	Boiler	WITHOUT Boiler	WITH Boiler	OFF
	SW1-2	Heat pump maximum outlet water temperature	55ºC	60ºC	ON
	SW1-3	DHW tank	WITHOUT DHW tank	WITH DHW tank	ON
	SW1-4	Immersion heater	WITHOUT Immersion heater	WITH Immersion heater	OFF
	SW1-5	Booster heater	WITHOUT Booster heater	WITH Booster heater	ON
	SW1-6	Booster heater function	For heating only	For heating and DHW	ON
	SW1-7	—	—	—	OFF
	SW1-8	Wireless remote controller	WITHOUT Wireless remote controller	WITH Wireless remote controller	OFF
SW2	SW2-1	Room thermostat1 input (IN1) logic change	Zone1 operation stop at thermostat short	Zone1 operation stop at thermostat open	OFF
	SW2-2	Flow switch1 input (IN2) logic change	Failure detection at short	Failure detection at open	OFF
	SW2-3	Booster heater capacity restriction	Inactive	Active	OFF
	SW2-4	—	—	—	OFF
	SW2-5	Automatic switch to backup heat source operation (When compressor stops by error)	Inactive	Active *1	OFF
	SW2-6	Mixing tank	WITHOUT Mixing tank	WITH Mixing tank	OFF
	SW2-7	2-zone temperature control	Inactive	Active *2	OFF
	SW2-8	—	—	—	ON
SW3	SW3-1	Room thermostat 2 input (IN6) logic change	Zone2 operation stop at thermostat short	Zone2 operation stop at thermostat open	OFF
	SW3-2	Flow switch 2,3 input (IN3,7) logic change	Failure detection at short	Failure detection at open	OFF
	SW3-3	—	—	—	ON
	SW3-4	Electric energy meter	WITHOUT Electric energy meter	WITH Electric energy meter	OFF
	SW3-5	—	—	—	OFF
	SW3-6	2-zone valve ON/OFF control	Inactive	Active	OFF
	SW3-7	—	—	—	ON
	SW3-8	Heat meter	WITHOUT Heat meter	WITH Heat meter	OFF
SW4	SW4-1	—	—	—	OFF
	SW4-2	—	—	—	OFF
	SW4-3	—	—	—	OFF
	SW4-4	Water circuit only operation (during installation work) *3	Inactive	Active	OFF
	SW4-5	Emergency mode (Heater only operation)	Normal	Emergency mode (Heater only operation)	OFF *4
	SW4-6	Emergency mode (Boiler operation)	Normal	Emergency mode (Boiler operation)	OFF *4
SW5	SW5-1	—	—	—	OFF
	SW5-2	Advanced auto adaptation	Inactive	Active	ON
	SW5-3	Capacity code	—	—	ON
	SW5-4		—	—	OFF
	SW5-5		—	—	OFF
	SW5-6		—	—	ON
	SW5-7		—	—	OFF
	SW5-8	—	—	—	OFF
SW6	SW6-1	—	—	—	OFF
	SW6-2	—	—	—	OFF
	SW6-3	—	—	—	OFF
	SW6-4	Analog output signal (0-10V)	Inactive	Active	OFF
	SW6-5	Model select	Air to Water	Brine to Water	ON

<Table 9.8.1>

Note: ***1. External output (OUT11) will be available. For safety reasons, this function is not available for certain errors. (In that case, system operation must be stopped and only the water circulation pump keeps running.)**
***2. Active only when SW3-6 is set to OFF.**
***3. Space heating and DHW can be operated only in water circuit, like an electric boiler.**
***4. If emergency mode is no longer required, return the switch to OFF position.**

(2) Function of switches (Controller circuit board)

DIP switch		Function	OFF	ON	Effective timing	Default settings
SW1	SW1-1	—	—	—	—	OFF
	SW1-2	Abnormal history clear	Normal	Clear	Always	OFF
SW4	SW4-1	—	—	—	—	OFF
	SW4-2	—	—	—	—	OFF
SW5	SW5-1	—	—	—	—	OFF
	SW5-2	Power failure automatic recovery*1	No auto recovery	Auto recovery	When power supply ON	ON
	SW5-3	—	—	—	—	OFF
	SW5-4	—	—	—	—	OFF
	SW5-5	—	—	—	—	OFF
	SW5-6	—	—	—	—	OFF
SW6	SW6-1	Brine pump manual operation	Pump OFF	Pump ON	Always (ONLY Brine pump manual operation)	OFF
	SW6-2	—	—	—	—	OFF
	SW6-3	Brine pump manual operation	Inactive	Active	When power supply ON	OFF
	SW6-4	Model select	Heat pump setting		—	ON
	SW6-5					ON
	SW6-6					OFF
	SW6-7					ON
	SW6-8					OFF
SW7 *2	SW7-1	—	—	—	—	OFF
	SW7-2	—	—	—	—	OFF
	SW7-3	—	—	—	—	OFF
	SW7-4	—	—	—	—	OFF
	SW7-5	—	—	—	—	OFF
	SW7-6	Starting brine temp. of borehole freeze prevention	−2°C	0°C	Always	OFF
SW8	SW8-1	Brine pump speed adjustment	See Installation manual '4.4 Brine Pipe Works'		Always	OFF
	SW8-2	—	—	—	—	OFF
	SW8-3	—	—	—	—	OFF
SW9	SW9-1	Brine pump rotational speed adjustment	See Installation manual '4.4 Brine Pipe Works'		Always	OFF
	SW9-2					OFF
	SW9-3					OFF
	SW9-4					OFF

<Table 9.8.2>

Note:

***1 "Power failure automatic recovery" can be set by either remote controller or this DIP SW. If one of them is set to ON, "Auto recovery" activates.**

***2 Please do not use SW7-3, 4 usually. Trouble might be caused by the usage condition.**

<Display function of inspection for heat pump unit>

The blinking patterns of both LED1 (green) and LED2 (red) on controller circuit board indicate the types of abnormality when it occurs. Types of abnormality can be indicated in details by connecting an optional part “A-Control Service Tool (PAC-SK52ST)” to connector CNM on controller circuit board.

[Display]

(1) Normal condition

Unit condition	Controller circuit board		A-Control Service Tool	
	LED1 (Green)	LED2 (Red)	Check code	Indication of the display
When the power is turned on	Lighted	Lighted	—⇔—	Alternately blinking display
When unit stops	Lighted	Not lighted	00, etc.	Operation mode
When compressor is warming up	Lighted	Not lighted	08, etc.	
When unit operates	Lighted	Lighted	C5, H7, etc.	

(2) Abnormal condition

Indication		Error			Detailed reference page
Controller circuit board		Contents	Check code*	Inspection method	
LED1 (Green)	LED2 (Red)				
1 blinking	2 blinking	Connector(63H) is open.	F5	① Check if connector (63H) on the controller board is not disconnected. ② Check continuity of pressure switch (63H) by tester.	P46
2 blinking	1 blinking	Miswiring of FTC/Controller circuit board connecting wire	—	① Check if FTC/Controller circuit board connecting wire is connected correctly. ② Check if noise entered into FTC/Controller circuit board connecting wire or power supply. ③ Re-check error by turning off power, and on again.	(EA)
		Miswiring of FTC/Controller circuit board connecting wire (converse wiring or disconnection)	—		(Eb)
		Startup time over	—		(EC)
	2 blinking	FTC/Controller circuit board communication error (signal receiving error) is detected by FTC.	E6	① Check if FTC/Controller circuit board connecting wire is connected correctly. ② Check if noise entered into FTC/Controller circuit board connecting wire or power supply. ③ Check if noise entered into FTC/Controller circuit board. ④ Re-check error by turning off power, and on again.	P.45
		FTC/Controller circuit board communication error (transmitting error) is detected by FTC.	E7		P.45
		FTC/Controller circuit board communication error (signal receiving error) is detected by controller circuit board.	—		(E8)
		FTC/Controller circuit board communication error (transmitting error) is detected by controller circuit board.	—		(E9)
	3 blinking	Remote controller signal receiving error is detected by remote controller.	E0	① Check if connecting wire of FTC or remote controller is connected correctly. ② Check if noise entered into transmission wire of remote controller. ③ Re-check error by turning off power, and on again.	P.44
		Remote controller transmitting error is detected by remote controller.	E3		P.45
		Remote controller signal receiving error is detected by FTC.	E4		P.44
		Remote controller transmitting error is detected by indoor FTC.	E5		P.45
	4 blinking	Check code is not defined.	EF	① Check if noise entered into transmission wire of remote controller. ② Check if noise entered into FTC/Controller circuit board connecting wire. ③ Re-check error by turning off power, and on again.	—
		Incorrect connection	EE	① Connect I/F to the unit.	—
	5 blinking	Serial communication error <Communication between controller circuit board and power circuit board>	Ed	① Check if connector (CN4) on controller circuit board and power circuit board is not disconnected.	—

* Check code displayed on remote controller

Indication		Error			Detailed reference page
Controller circuit board		Contents	Check code*	Inspection method	
LED1 (Green)	LED2 (Red)				
3 blinking	1 blinking	Abnormality of discharge temperature (TH4) and Comp. surface temperature (TH33)	U2	① Check if stop valves are open. ② Check if connectors (TH4, LEV-A) on controller circuit board are not disconnected. ③ Check if unit is filled with specified amount of refrigerant. ④ Measure resistance values among terminals on linear expansion valve using a tester.	P46
		Abnormality of superheat due to low discharge temperature	U7		P47
	2 blinking	Abnormal high pressure (High pressure switch 63H operated.)	U1	① Check if connector(63H)(63L) on controller circuit board is not disconnected. ② Check if filter is not dirty. ③ Measure resistance values among terminals on linear expansion valve using a tester.	P46
		Abnormal low pressure	UL		P48
		Abnormal low brine flow rate (flow switch operated)	UA		P48
	3 blinking	Abnormality of brine pump motor rotational speed	U8	① Check the brine pump motor. ② Check if connector (TH3) (63HS) on controller circuit board is disconnected.	P47
		Protection from overheat operation (TH3)	Ud		—
	4 blinking	Compressor overcurrent breaking (Start-up locked)	UF	① Check looseness, disconnection, and converse connection of compressor wiring. ② Measure resistance values among terminals on compressor using a tester. ③ Check leakage of refrigerant.	P48
		Compressor overcurrent breaking	UP		P48
		Abnormality of current sensor (P.B.)	UH		P48
		Abnormality of power module	U6		P47
	5 blinking	Open/short of heat pump unit thermistors (TH4, TH33)	U3	① Check if connectors (TH3, TH32, TH34, TH4, TH33 and TH7) on controller circuit board and connector (CN3) on power circuit board are not disconnected. ② Measure resistance value of heat pump unit thermistors.	P46
		Open/short of heat pump unit thermistors (TH3, TH32, TH34, TH7 and TH8)	U4		P47
	6 blinking	Abnormality of heat sink temperature	U5	① Measure resistance value of outdoor thermistor(TH8).	P47
	7 blinking	Abnormality of voltage	U9	① Check looseness, disconnection, and converse connection of compressor wiring. ② Measure resistance value among terminals on compressor using a tester. ③ Check if power supply voltage decreases. ④ Check the wiring of X52CA. ⑤ Check the wiring of CNAC.	P47-P48
4 blinking	1 blinking	Abnormality of room temperature thermistor (TH1)	P1	① Check if connectors on FTC are not disconnected. ② Measure resistance value of FTC thermistors.	P44
		Abnormality of pipe temperature thermistor /Liquid (TH2)	P2		P44
		Abnormality of tank temperature thermistor	P9		—
	4 blinking	Abnormality of pipe temperature	P8	① Check if FTC thermistors(TH2) are not disconnected from holder. ② Check if stop valve is open.	—

* Check code displayed on remote controller
** Refer to service manual for indoor unit.

<Heat pump unit operation monitor function>
[When optional part "A-Control Service Tool (PAC-SK52ST)" is connected to Controller circuit board (CNM)]
Digital indicator LED1 displays 2 digit number or code to inform operation condition and the meaning of error code by controlling DIP SW2 on "A-Control Service Tool".

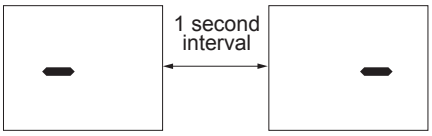
Operation indicator SW2 : Indicator change of self diagnosis

The black square (■) indicates a switch position.

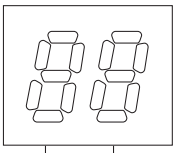
SW2 setting	Display detail	Explanation for display	Unit
ON 1 2 3 4 5 6			

<Digital indicator LED1 working details>
(Be sure that 1 to 6 in the SW2 are set to OFF.)

(1) Display when the power supply ON
When the power supply ON, blinking displays by turns.
Wait for 4 minutes at the longest.



(2) When the display lights (Normal operation)
① Operation mode display

LED1  (Lighting)

SW2
ON 1 2 3 4 5 6 (Initial setting)

The tens digit : Operation mode

Display	Operation Model
O	OFF / pump
H	HEATING

② Display during error postponement
Postponement code is displayed when compressor stops due to the work of protection device.
Postponement code is displayed while error is being postponed.

The ones digit : Relay output

Display	Warming-up Compressor	Compressor
0	—	—
1	—	—
2	—	—
3	—	—
4	—	ON
5	—	ON
6	—	ON
7	—	ON
8	ON	—
A	ON	—

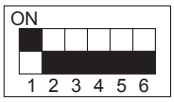
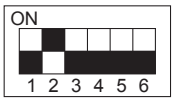
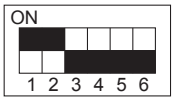
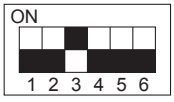
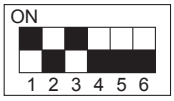
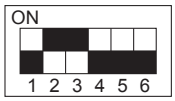
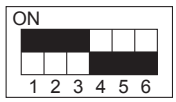
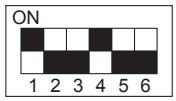
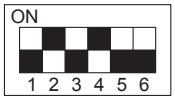
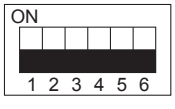
(3) When the display blinks
Inspection code is displayed when compressor stops due to the work of protection devices.

Display	Contents to be inspected (During operation)
U1	Abnormal high pressure (63H operated)
U2	Abnormal high discharge temperature, high comp. surface temperature, shortage of refrigerant
U3	Open/short of heat pump unit thermistors (TH4, TH33)
U4	Open/short of heat pump unit thermistors (TH3, TH32, TH34, TH7 and TH8)
U5	Abnormal temperature of heat sink
U6	Abnormality of power module
U7	Abnormality of superheat due to low discharge temperature
U8	Abnormality in brine pump motor
Ud	Overheat protection
UF	Compressor overcurrent interruption (When Comp. locked)
UH	Current sensor error
UL	Abnormal low pressure
UP	Compressor overcurrent interruption
P1–P8	Abnormality of FTC

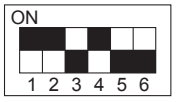
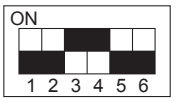
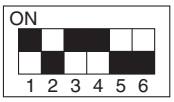
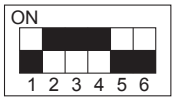
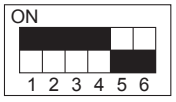
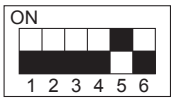
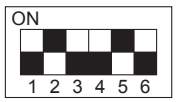
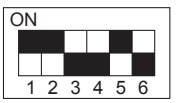
Display	Inspection circuit board
0	Controller circuit board
1	FTC

Display	Contents to be inspected (When power is turned on)
F3	63L connector(red) is open.
F5	63H connector(yellow) is open.
F9	2 connectors(63H/63L) are open.
E8	FTC/Controller circuit board communication error (Signal receiving error) (Controller circuit board)
E9	FTC/Controller circuit board communication error (Transmitting error) (Controller circuit board)
EA	Miswiring of FTC/Controller circuit board unit connecting wire
Eb	Miswiring of FTC/Controller circuit board unit connecting wire(converse wiring or disconnection)
EC	Startup time over
EE	Incorrect connection
E0–E7	Communication error except for controller circuit board

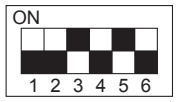
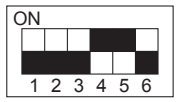
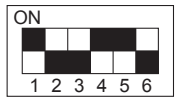
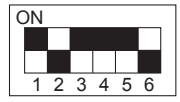
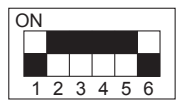
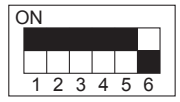
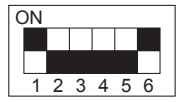
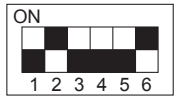
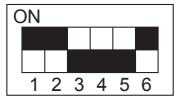
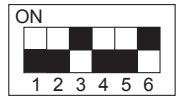
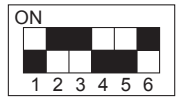
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Pipe temperature/Liquid (TH3) −40 to 90	−40 to 90 (When the coil thermistor detects 0℃ or below, "–" and temperature are displayed by turns.) (Example) When −10℃; 0.5 s 0.5 s 2 s -□ →10 →□□	℃
	Discharge temperature (TH4) 3 to 217	3 to 217 (When the discharge thermistor detects 100℃ or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105℃; 0.5 s 0.5 s 2 s □1 →05 →□□	℃
	Output step of brine pump 0 to 10	0 to 10	Step
	The number of ON/OFF times of compressor 0 to 9999	0 to 9999 (When the number of times is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 42500 times (425 ×100 times); 0.5 s 0.5 s 2 s □4 →25 →□□	100 times
	Compressor integrating operation times 0 to 9999	0 to 9999 (When it is 100 hours or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 2450 hours (245 ×10 hours); 0.5 s 0.5 s 2 s □2 →45 →□□	10 hours
	Compressor operating current 0 to 50	0 to 50 Note: Value after the decimal point will be truncated.	A
	Compressor operating frequency 0 to 225	0 to 255 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 125 Hz; 0.5 s 0.5 s 2 s □1 →25 →□□	Hz
	Error postponement code history (1) of heat pump unit	Postponement code display Blinking: During postponement Lighting: Cancellation of postponement "00" is displayed in case of no postponement.	Code display
	Operation mode on error occurring	Operation mode of when operation stops due to error is displayed by setting SW2 like below. (SW2) 	Code display

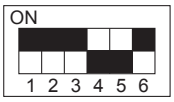
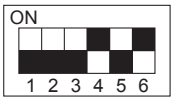
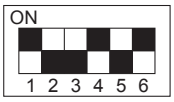
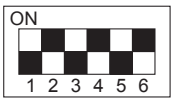
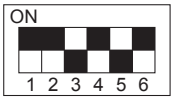
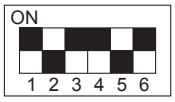
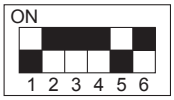
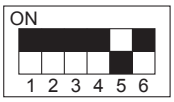
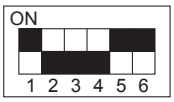
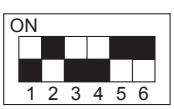
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Pipe temperature/Liquid (TH3) on error occurring −40 to 90	−40 to 90 (When the coil thermistor detects 0℃ or below, "–" and temperature are displayed by turns.) (Example) When −15℃; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Discharge temperature (TH4) on error occurring 3 to 217	3 to 217 (When the temperature is 100℃ or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 130℃; 0.5 s 0.5 s 2 s □1 →30 →□□	℃
	Compressor operating current on error occurring 0 to 50	0 to 50	A
	Error history (1) (latest) Alternate display of abnormal unit number and code	When no error history, " 0 " and "– –" are displayed by turns.	Code display
	Error history (2) Alternate display of error unit number and code	When no error history, " 0 " and "– –" are displayed by turns.	Code display
	Thermo ON time 0 to 999	0 to 999 (When it is 100 minutes or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 245 minutes; 0.5 s 0.5 s 2 s □2 →45 →□□	Minute
	Test run elapsed time 0 to 120	0 to 120 (When it is 100 minutes or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105 minutes; 0.5 s 0.5 s 2 s □1 →05 →□□	Minute
	Capacity setting display	Displayed as an outdoor capacity code. Capacity: EHGT17D-YM9ED — Code: 14	Code display
	Refrigerant circuit setting information	• The tens digit (Total display for applied setting) H·P / Cooling only: 0 : H·P 1 : Cooling only Single phase / 3 phase: 0 : Single phase 2 : 3 phase • The ones digit Defrosting switch: 0 : Normal 1 : For high humidity (Example) When heat pump, 3 phase and defrosting (normal) are set up, "20" is displayed.	Code display

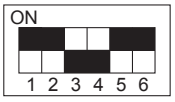
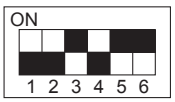
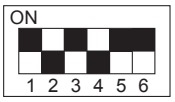
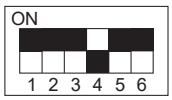
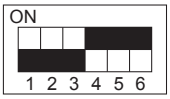
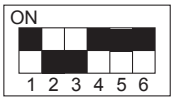
The black square (■) indicates a switch position.

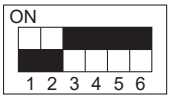
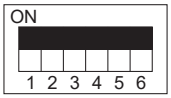
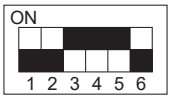
SW2 setting	Display detail	Explanation for display	Unit
	Liquid pipe temperature (TH2) −39 to 88	−39 to 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	Indoor ambient temperature (TH1) 8 to 39	8 to 39	℃
	Target flow water temperature 0 to 100	0 to 100	℃
	Outside temperature (TH7) −39 to 88	−39 to 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	Heat pump unit heat sink temperature (TH8) −40 to 200	−40 to 200 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.) (When the thermistor detects 100℃ or more, hundreds digit, tens digit and ones digit are displayed by turns.)	℃
	Discharge superheat SHd 0 to 255 [Heating = TH4−T_{63HS}]	0 to 255 (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.)	℃
	Input current of heat pump unit	0 to 500 (When it is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.)	0.1 A
	Secondary LEV opening pulse 0 to 500 Heating: LEV-A	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.)	Pulse
	U9 error detail history (latest)	<table><tr><th>Description</th><th>Display</th></tr><tr><td>Normal</td><td>00</td></tr><tr><td>Overvoltage error</td><td>01</td></tr><tr><td>Undervoltage error</td><td>02</td></tr><tr><td>Input current sensor error L_1-phase open error</td><td>04</td></tr><tr><td>Abnormal power synchronous signal</td><td>08</td></tr><tr><td>PFC/IGBT error (SW-V, SHW-V) Undervoltage</td><td>20</td></tr></table> • Display examples for multiple errors: Overvoltage (01) + Undervoltage (02) = 03 Undervoltage (02) + Power-sync signal error (08) = 0A L_1 phase open error (04) + PFC/IGBT error (20) = 24	Code display
	DC bus voltage 180 to 370	180 to 370 (When it is 100 V or more, hundreds digit, tens digit and ones digit are displayed by turns.)	V
	Error postponement code history (2) of heat pump unit	Postponement code display Blinking: During postponement Lighting: Cancellation of postponement "00" is displayed in case of no postponement.	Code display

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Error postponement code history (3) of heat pump unit	Postponement code display Blinking: During postponement Lighting: Cancellation of postponement “00” is displayed in case of no postponement.	Code display
	Error history (3) (Oldest) Alternate display of abnormal unit number and code	When no error history, “0” and “– –“ are displayed by turns.	Code display
	Error thermistor display [When there is no error thermistor, “–“ is displayed.]	3: Liquid pipe temperature (TH3) 4: Discharge pipe temperature (TH4) 7: Ambient temperature (TH7) 8: Heat sink temperature (TH8) 32: Brine inlet temperature (TH32) 33: Comp. surface temperature (TH33) 34: Brine outlet temperature (TH34)	Code display
	Operation frequency on error occurring 0 to 255	0 to 255 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 125 Hz; 0.5 s 0.5 s 2 s □1 →25 →□□	Hz
	Fan step on error occurring 0 to 10	0 to 10	Step
	Return water temperature on error occurring 0 to 100	0 to 100	℃
	Liquid pipe temperature (TH2) on error occurring −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Pressure saturation temperature (T_{63HS})/ Indoor pipe temperature/Cond./Eva.(TH5) on error occurring −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Outside temperature (TH7) on error occurring −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Heat pump unit heat sink temperature (TH8) on error occurring −40 to 200	−40 to 200 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.)	℃

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Discharge superheat on error occurring SHd 0 to 255 [Heating = TH4−T_{63HS}]	0 to 255 (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 150°C; 0.5 s 0.5 s 2 s □1 →50 →□□	℃
	Sub cool on error occurring SC 0 to 130 [Heating = T_{63HS}−TH2]	0 to 130 (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 115°C; 0.5 s 0.5 s 2 s □1 →15 →□□	℃
	Thermo-on time until error stops 0 to 999	0 to 999 (When it is 100 minutes or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 415 minutes; 0.5 s 0.5 s 2 s □4 →15 →□□	Minute
	Pressure saturation temperature (T_{63HS})/ Indoor pipe temperature/Cond./ Eva. (TH5 (3)) Indoor 3 −39 to 88	−39 to 88 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) When there is no indoor unit, "00" is displayed.	℃
	Comp. surface temperature (TH33) −52 to 221	−52 to 221 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.) (When the discharge thermistor detects 100°C or more, hundreds digit, tens digit, and ones digit are displayed by turns.) (Example) When 105℃; 0.5 s 0.5 s 2 s □1 →05 →□□	℃
	Controlling status of compressor operating frequency	The following code will be a help to know the operating status of unit. •The tens digit Display: 1 — Compressor operating frequency control: Primary current control Display: 2 — Compressor operating frequency control: Secondary current control •The ones digit (In this digit, the total number of activated control is displayed.) Display: 1 — Preventive control for excessive temperature rise of discharge temperature Display: 2 — Preventive control for excessive temperature rise of condensing temperature Display: 4 — Frosting preventing control Display: 8 — Preventive control for excessive temperature rise of radiator panel (Example) The following controls are activated. • Primary current control • Preventive control for excessive temperature rise of condensing temperature • Preventive control for excessive temperature rise of heat sink LED: 1A	Code display

SW2 setting	Display detail	Explanation for display	Unit
	Brine inlet temperature (TH32) −39 to 88	−39 to 88 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (Example) When –15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Borehole freeze prevention status	Display / Status 0 No restriction 1 Stage A 2 Stage B 3 Stage C 4 Stage D 5 COMP OFF	–
	Brine outlet temperature (TH34) −39 to 88 Heating: TH6 Cooling: T_{63HS}	−39 to 88 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (Example) When –15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃

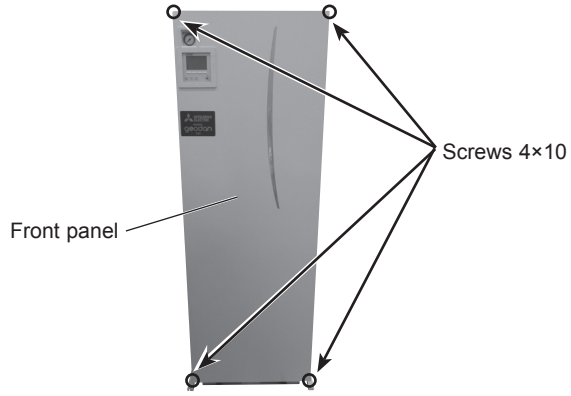
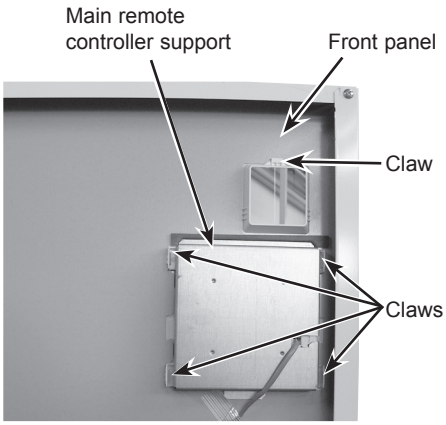
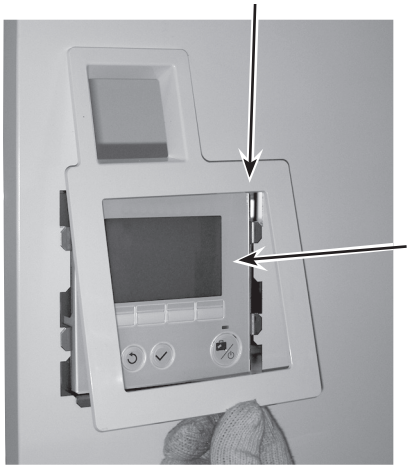
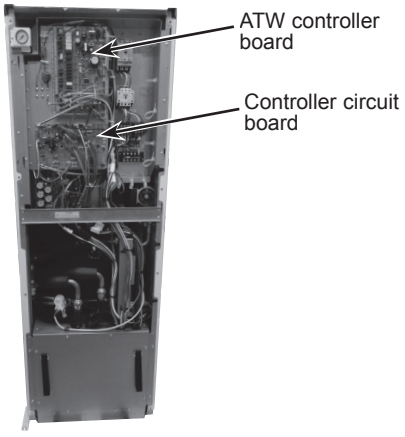
10 DISASSEMBLY PROCEDURE

<Service Precautions>

Before beginning any service you must confirm the following precautions and instructions.

1. Be sure to turn off the power supply before service.
2. Take care when you handle heavy items.
3. When welding, be sure to perform non-oxidation welding.
4. Do not burn lead wires and insulators when detaching brazing portions.
5. Pipe edges, flange surfaces, sealing surfaces, screws, and pipe covers must not have any damages.
6. Do not release hydrofluorocarbon. Be sure to recover hydrofluorocarbon to prevent global warming when exchanging the parts of the refrigerant circuit.
7. Make sure the locks of connectors and terminals are engaged when inserting them. They must not be loosened.
8. Connectors and terminals must not have any damage or dirt.
9. When routing wires,
   - do not apply load to lead wires, the edges of lead wires, the connectors, and the controller board.
   - do not let them touch pipes, the edges of the plate, and the mounted parts on the controller board.
   - do not trap them between sheet metals.
10. Do not fold the wires as it may cause their breakage.
11. Make sure the controller boards are fixed down to the support and free from looseness.
12. Do not give any shock on the controller board.
13. Any dust must not be attached on the controller board.
14. Do not damage the mounted parts on the controller board.
15. The wires must not move after being bundled with a cable strap.
16. When bundling wires with a fastener, be sure to fasten them without looseness.
17. Fasten bands at 90^{+30}_{0} N of tightening force.
18. Cut off excess bands.
19. When removing bands, obtain them locally to replace.
20. When replacing an O-ring, use the suitable one for each part.
    - For the brine pump and the flow sensor: E210 (manufactured by NOK)
    - For the flow switch: XVH756 (SIKA)
    - For the 3-way valve and the drain cock [DHW tank]: P16 E210 (NOK)
    - For the other parts: P22 E210 (NOK)

    Apply grease (KS-651 8 [Shin-Etsu Chemical Co.]) at the portion to put O-rings.
21. When replacing a gasket, use the suitable one (the size and the use) for each part.
    - G1", G3/4", G3/8", and G1/4" gasket for water: G1", G3/4", G3/8", and G1/4" (NICHIAS Corporation)
    - G1" gasket for brine: G1" (PTFE) (NICHIAS Corporation)
22. Make sure of no moisture or water on the controller boards, the electrical parts, and the connectors.
23. Assemble the parts in the opposite order of disassembly.
24. Put the lead wire and the connector in the right place refer to the page 89 when the lead wire routing/fixing and the connection to the connector.

DISASSEMBLY PROCEDURE	PHOTOS/ FIGURES
1. How to remove the front panel (1) Remove the front panel (4 screws 4×10). (2) Disconnect the relay connector (Blue/3 pins) in the back of the front panel.	**Photo 1** 
2. How to remove the main remote controller (1) Remove the front panel (Refer to Procedure 1). (2) Turn the front panel over and remove the main remote controller holder by removing the 5 claws. (Photos 2-1 and 2-2) (3) Slide the main remote controller support upward, then remove it together with the main remote controller. (Photo 2-2) (4) Separate the main remote controller from the main remote controller support. (Photos 2-1 and 2-3)	
Photo 2-1  	**Photo 2-2** 
	Photo 2-3 
3. How to remove the ATW controller board and the controller board (1) Remove the front panel. (Refer to Procedure 1.) (2) Disconnect the lead wires from the ATW controller board and the controller circuit board. (Photo 3) (3) Remove the ATW controller board and the controller circuit board from the supports. **Note: When reassembling the electrical parts box, make sure the wirings are correct.**	**Photo 3** 

DISASSEMBLY PROCEDURE

4. How to remove the converter circuit board, the power circuit board, and noise filter circuit board

(1) Remove the front panel. (Refer to Procedure 1.)

(2) Remove the frame from the side frame (4 screws 4×10). (Photo 4-1)

(3) Loosen the fastener bundling the lead wires connected to the ATW controller board and the controller circuit board.

(4) Disconnect the lead wires connected to the controller boards, the contactors and the CONT base front as below. (Photo 4-1 and 4-3)
- ATW controller board
  CNP4/ CNBC/ CNBH/ CNW5/ CN851
- Control circuit board
  CNDC/ CNAC/ TH7/ CN2/ CN4
- Contactor [BHC1] [BHC2]
  2, 4, 6
- Earth wire
  CN4P

(5) Disconnect the relay connectors of the lead wires on the control box. (Photo 4-2)

Connector color	Number of pins	Applicable parts
White	9	LEV-A / Flow SW / HP SW
White	16	Thermistor
White	12	Booster heater Primary side pump (power)
White	8	Brine pump
White	10	Primary side pump (control) Flow sensor Pressure sensor

(6) Release the lead wires from the wiring part and the cable straps in the control box (Photo 4-2).

(7) Remove the CONT base front from the control box (5 screws 4x10). (Photo 4-3)

(8) Release the lead wires connected to the converter circuit board, the noise filter circuit board, and the power circuit board from the fasteners.

(9) Disconnect the lead wires from the converter circuit board, the noise filter circuit board, and the power circuit board. (Photo 4-4)

(10) Remove the converter circuit board,and the noise filter circuit board from the supports.

(11) Remove 4 cross recessed head screws with captive washer 4×14 to remove the power circuit board from the support.

Note: When reassembling the electrical parts box, make sure the wirings are correct.
Tighten cross recessed head screws with captive washer 4×14.
Temporarily tightening torque: 0.7 $^{+0.04}_{-0.10}$ N•m
Tightening torque: 1.3 $^{+0.17}_{-0.10}$ N•m
Temporarily tighten IPM and diode bridge in the order from screw A to D.
Tighten IPM and diode bridge in the order from screw D to A.

PHOTOS/ FIGURES

Photo 4-1

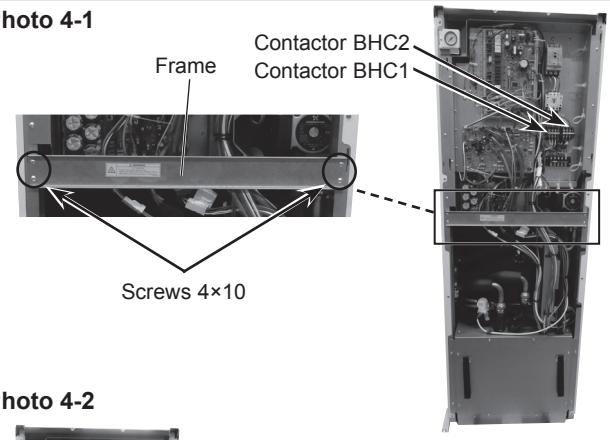


Photo 4-2

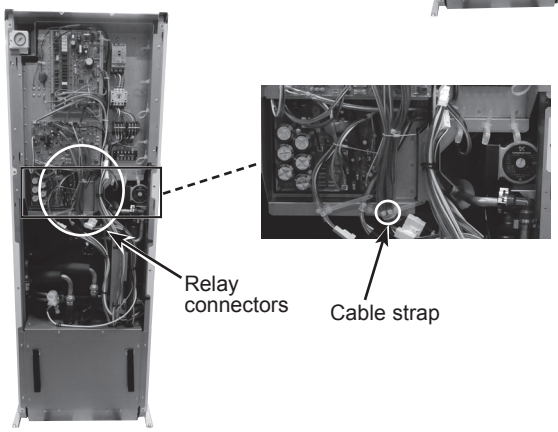


Photo 4-3

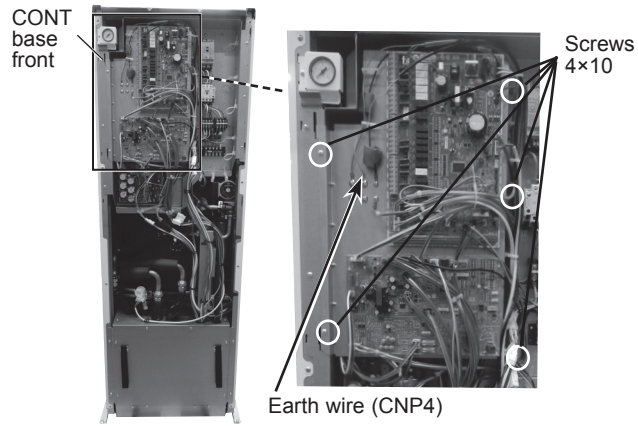
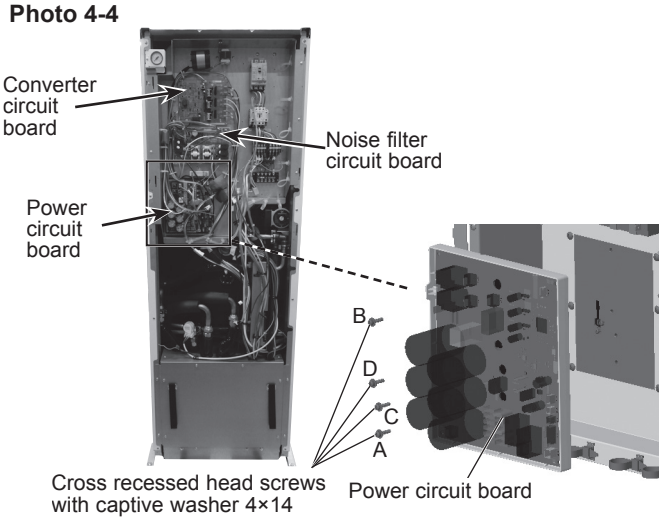


Photo 4-4



DISASSEMBLY PROCEDURE

5 . How to remove the control box

(1) Remove the front panel. (Refer to Procedure 1.)
(2) Remove the frame. (Refer to Procedure 4-2.)
(3) Disconnect the lead wires connected to the following controller boards and the CONT base front. (Photo 4-3)
- ATW controller board: CNP4 / CNW5 / CN851
- Controller circuit board: TH7 ● Lead wire: CNP4

(4) Disconnect the relay connectors below. (Photo 4-2).

Connector color	Number of pins	Applicable parts
White	3	Comp
Black	6	Reactor
White	9	LEV-A / Flow SW / HP SW
White	16	Thermistor
White	12	Booster heater Primary side pump (power)
White	8	Brine pump
White	10	Primary side pump (control)/ Flow sensor/ Pressure sensor

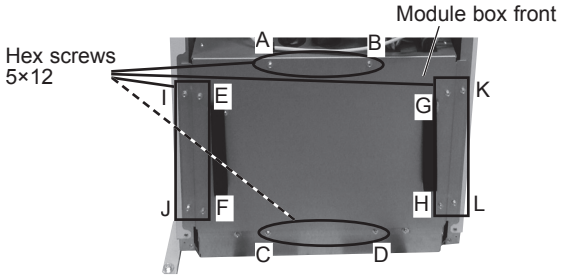
(5) Release the lead wires (Refer to Procedure 5-3.) from the wiring part in the control box.
(6) Disconnect the on-site wires from the terminal block and the breaker in the control box to release the wires from the wiring part in the control box.
(7) Release the lead wires (Refer to Procedure 5-3.) and on-site wires from the clamps and the cable straps in the control box . (Photo 4-2)
(8) Remove the screws fixing the control box and the side frame (6 screws 4x10). (Photo 5-1)
(9) Disengage the tabs on the left, then pull the control box and swing it to the right.
(10) Release the lead wires from the clamps on the back side of the control box. (Photo 5-2)
(11) Disengage the tabs on the right, then remove the control box from the side frame. (Photo 5-1)

6. How to remove 3-way valve

(1) Remove the front panel. (Refer to Procedure 1.)
(2) Remove the lead wire connected to the 3-way valve. (Photo 6-3)
(3) Remove the module box front from the module box assy and the side frame. (12 Hex screws from A to L 5×12) (Photo 6-1)
(4) Drain and collect water from the drain cock on the water pump circuit. (Photo 6-2)
(5) Remove the 3-way valve, the 3 fasteners, the 3 O-rings from the pipes connected to the 3-way valve. (Photo 6-3)

Notes:
1. Use Hex screws 5×12 to fix the module box front. Tighten the module box front in the order from screw A to L.

Photo 6-1



PHOTOS/ FIGURES

Photo 5-1

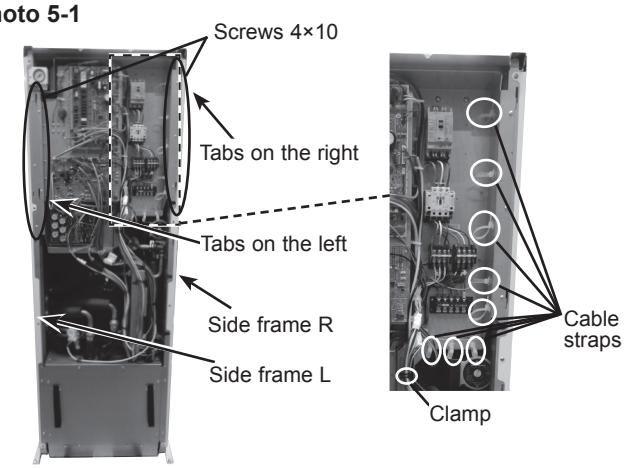


Photo 5-2

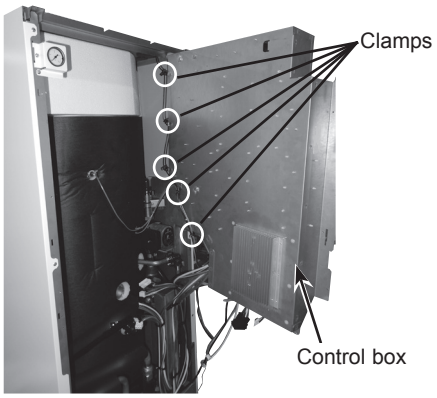


Photo 6-2

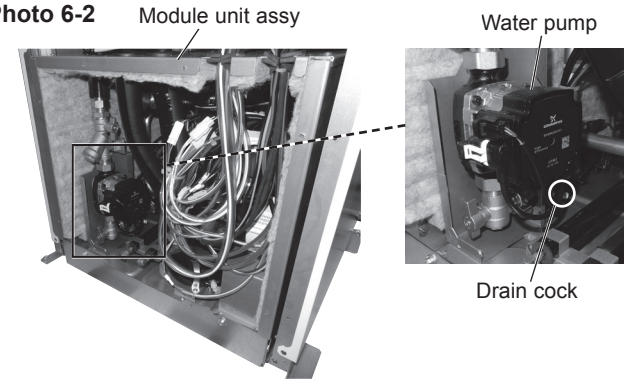
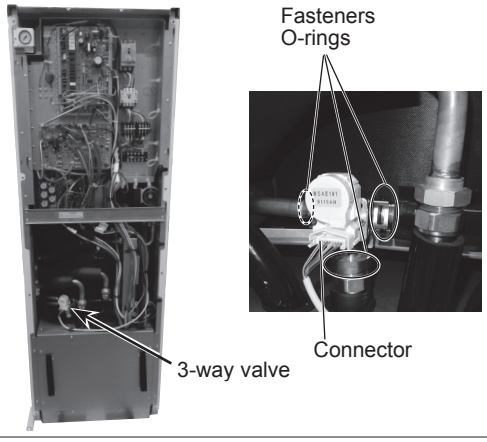
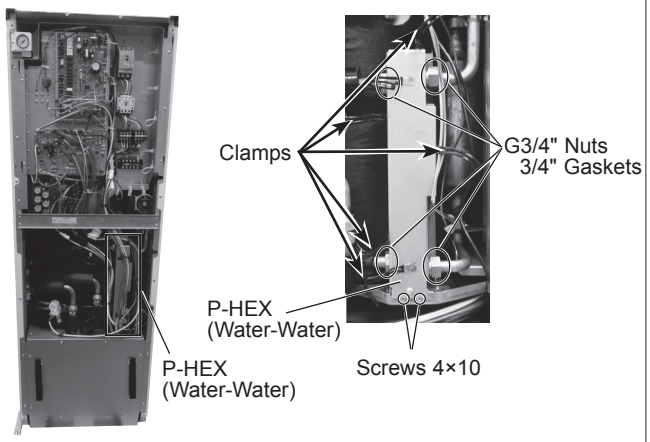
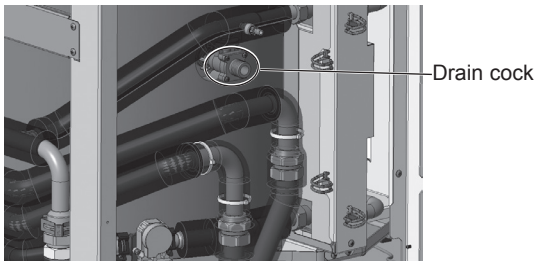
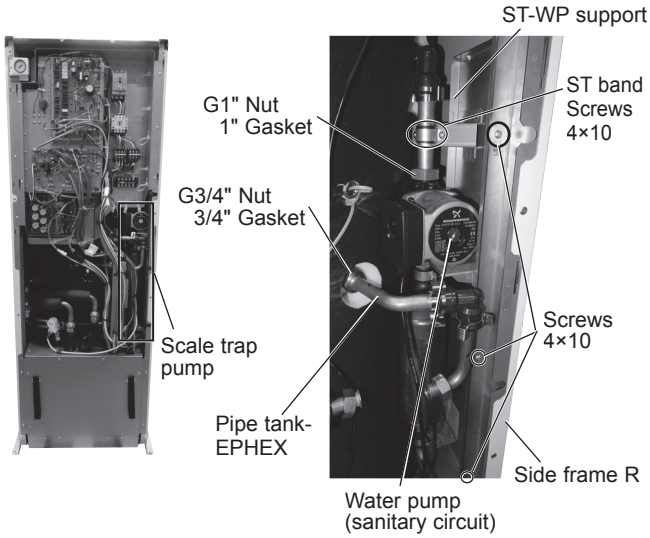
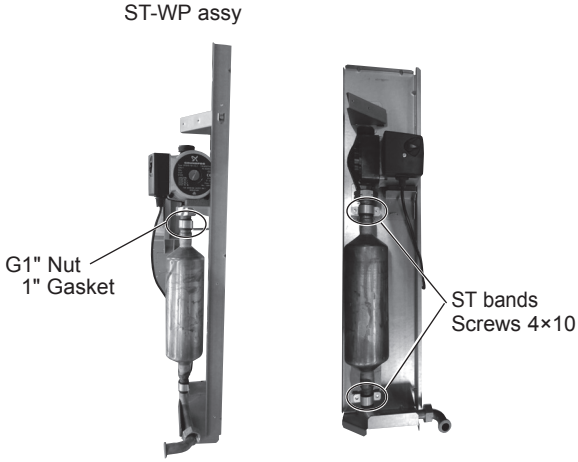


Photo 6-3



DISASSEMBLY PROCEDURE	PHOTOS/ FIGURES
7. How to remove the P-HEX (Water-Water) (1) Remove the front panel. (Refer to Procedure 1.) (2) Remove the frame. (Refer to Procedure 4-2.) (3) Release the lead wires from the clamp on the control box. (Photo 5-1) (4) Remove the module box front. (Refer to Procedure 6-3.) (5) ▪ Drain and collect water. (Refer to Procedure 6-4.) ▪ Recover water from the drain cock of tank. (Figure 7) (6) Release the lead wires from the clamps on the P-HEX (Water-Water). (Photo 7) (7) Remove the G3/4" nuts and the 4 of 3/4" gaskets from the P-HEX (Water-Water). (Photo 7) When removing the P-HEX (Water-Water) and water comes out from inside, recover water with a container. (8) Remove the screws fixing P-HEX (Water-Water) and the tank base (2 screws 4x10). (9) Remove the P-HEX (Water-Water). Note: Tightening torque of the G3/4" nuts: 42 ± 2 N▪m	**Photo 7**  **Figure 7** 
8. How to remove the scale trap and the water pump (sanitary circuit) (1) Remove the front panel. (Refer to Procedure 1.) (2) Remove the frame. (Refer to Procedure 4-2.) (3) Remove the control box. (Refer to Procedure 5.) (4) Remove the P-HEX (Water-Water). (Refer to Procedure 7.) (5) Remove the pipe tank-EPHEX. (G3/4" nuts, 3/4" gaskets) (Photo 8-1) (6) Remove the ST band above the water pump (sanitary circuit) (2 screws 4x10). (Photo 8-1). (7) Remove the G1" nut and the 1" gasket on the water pump (sanitary circuit). (Photo 8-1) (8) Remove the ST-WP support from the side frame R (2 screws 4×10). (Photo 8-1) (9) Remove the G1" nut and the 1" gasket under the water pump from the ST-WP assy. (Photo 8-2) (10) Remove the ST band on and under the scale trap from the ST-WP assy (2 screws 4x10) each at 2 positions). (Photo 8-2) (11) Remove the scale trap and the water pump. Note: The tightening torque of the G1" nut: 42 ± 2 N▪m	**Photo 8-1**  **Photo 8-2** 

Water pump
(sanitary circuit)

Scale strap

DISASSEMBLY PROCEDURE

9. How to remove the manometer

(1) Remove the front panel. (Refer to Procedure 1.)
(2) Remove the side panel L (13 screws 4×10). (Figure 9-1)
(3) Remove the frame. (Refer to Procedure 4-2.)
(4) Disconnect the relay connectors. (Refer to Procedure 5-4.)
(5) Release the lead wires from the control box clamp. (Photo 5-1.)
(6) Remove the screws fixing the control box and the side frame. (Refer to Procedure 5-8.)
(7) Disengage the tabs on the left, then pull the control box and swing it to the right. (Refer to Procedure 5-9.)
(8) Remove the G1/4" nut from the pressure relief valve using 2 spanners: one to hold the G1/4" joint and the other to turn the manometer connection. (Figure 9-2)
(9) Remove the 2 screws to remove the manometer cover with the manometer from the side frame L by sliding it upward. (Figure 9-2 and 9-3)
(10) Remove the manometer from the manometer cover while pressing on the 2 claws. (Photo 9-1)
• When reinstalling the manometer assembly on the unit, beware not to put strain on the root of the capillary tube as the capillary tube is easy to break at the root. (Photo 9-2)

Note:
1. Tightening torque of the G1/4" connection : 8 ± 1 N▪m

PHOTOS/ FIGURES

Figure 9-1

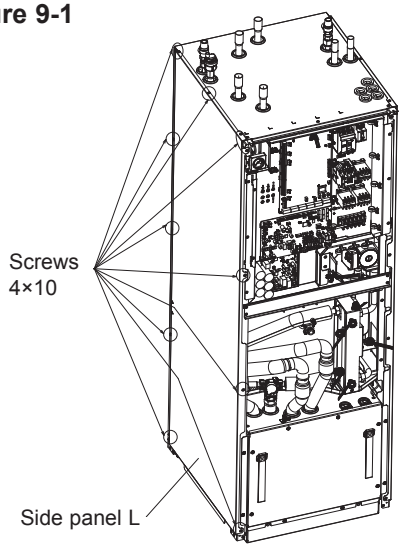


Figure 9-2

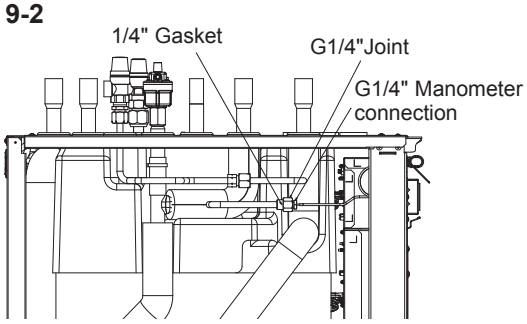


Figure 9-3

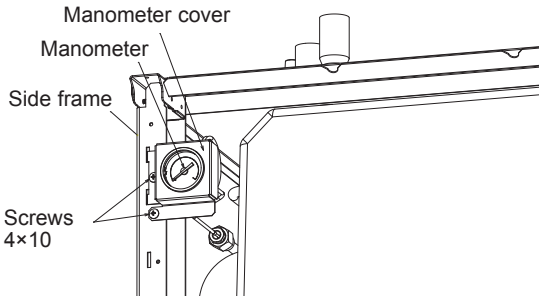


Photo 9-1

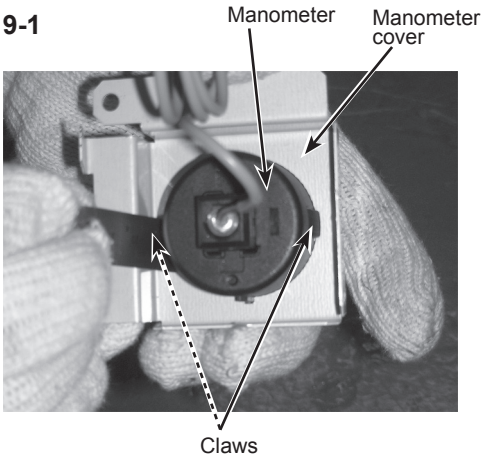
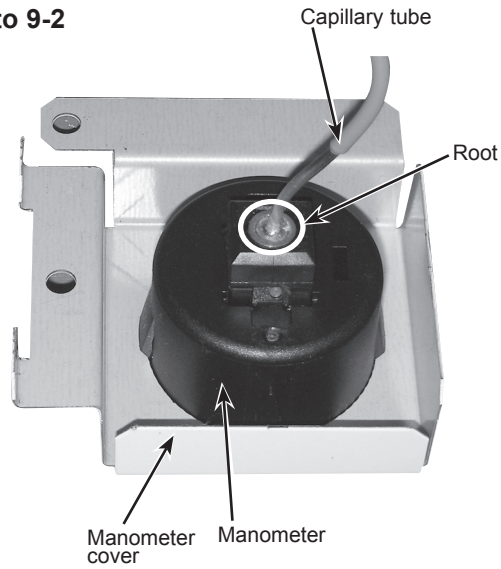


Photo 9-2



DISASSEMBLY PROCEDURE

10. How to remove the pressure relief valve/ air vent (automatic)

<Pressure relief valve (3 bar)>

(1) Remove the field piping from the pressure relief valve (3 bar). (Figure 10-1)

(2) Remove the pressure relief valve (3 bar) with the flare joint using 2 spanners: one to hold the flare joint and the other to turn the flare nut. (Figure 10-2)

(3) Remove the pressure relief valve (3 bar) using 2 spanners: one to hold the flare joint and the other to turn the pressure relief valve (3 bar). (Figure 10-3)

(4) Eliminate loctite on the thread surfaces using remover. (Figure 10-3)

- Before reinstallation, apply loctite over the thread surface on the pressure relief valve.
- For more details about the loctite and the remover, refer to page 90.

Note: The tightening torque of the pressure relief valve (3 bar) : 35 ± 2 N▪m

<Air vent (automatic)>

(1) Remove the air vent (automatic) using 2 spanners: one to hold the air vent joint and the other to turn the air vent. (Figure 10-4)

Note: The tightening torque of the air vent (automatic): 3.5 ± 1 N▪m

<Pressure relief valve (10 bar)>

(1) Remove the field piping from the pressure relief valve (10 bar). (Figure 10-1)

(2) Remove the pressure relief valve (10 bar) with the flare joint using 2 spanners: one to hold the flare joint and the other to turn the flare nut. (Figure 10-5)

(3) Remove the pressure relief valve (10 bar) using 2 spanners: one to hold the flare joint and the other to turn the pressure relief valve (10 bar). (Figure 10-6)

(4) Eliminate loctite on the thread surfaces using remover. (Figure 10-6)

- Before reinstallation, apply loctite over the thread surface on the pressure relief valve.
- For more details about the loctite and the remover, refer to page 90.

Note: The tightening torque of the pressure relief valve (10 bar): 40 ± 2 N▪m

PHOTOS/ FIGURES

Figure 10-1

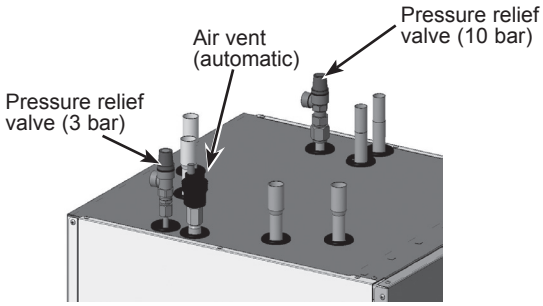


Figure 10-2

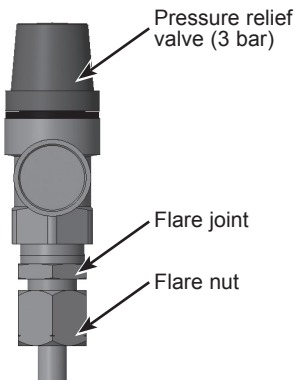


Figure 10-3

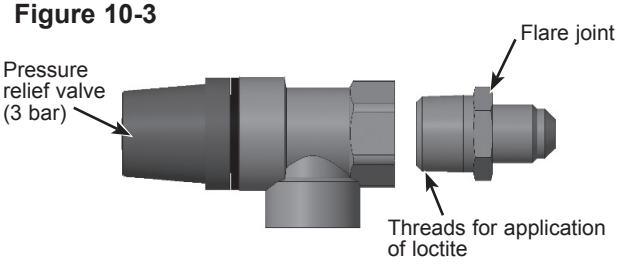


Figure 10-4

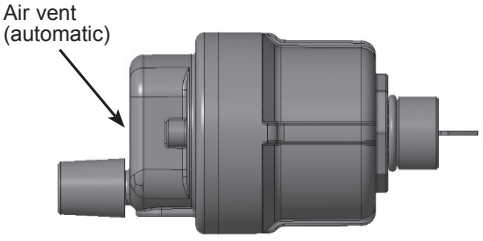


Figure 10-5

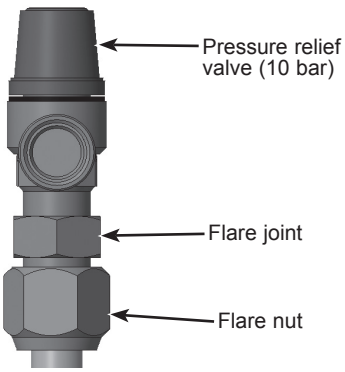
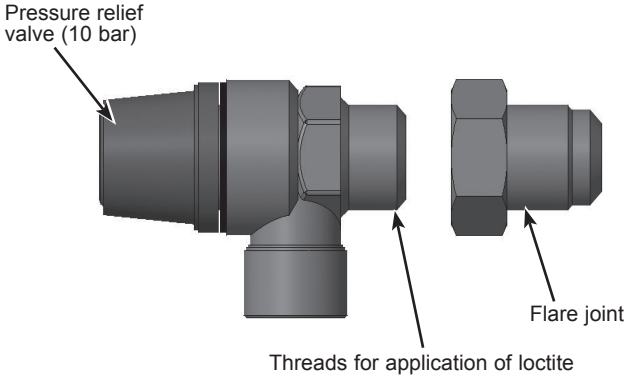


Figure 10-6



DISASSEMBLY PROCEDURE

11. How to pull out the module unit assy

(Pull out the module unit assy before removing the reactor, brine pump, water pump, flow switch, booster heater, LEV, COMP, P-HEX, flow sensor, H.P. switch, or H.P. sensor, muffler.)

(1) Remove the front panel. (Refer to Procedure 1.)
(2) Remove the frame. (Refer to Procedure 4-2.)
(3) Remove the module box front. (Refer to Procedure 6-3.)
(4) Drain and collect water. (Refer to Procedure 6-4.)
(5) Drain and collect brine from the drain cock below the brine pump. (Photo 11-1)
(6) Tighten the module box front to the module box assy with 8 HEX screws 5x12 from A to H. (Photo 11-2)
(7) Disconnect the relay connectors below the table. (Photo 4-2)

Connector color	Number of pins	Applicable parts
White	3	Comp
White	9	LEV-A / Flow SW / HP SW
White	16	Thermistor
White	12	Booster heater Primary side pump (power)
White	8	Brine pump
White	10	Primary side pump (control)/ Flow sensor/ Pressure sensor

(8) Release the lead wires from the clamp on the control box. (Photo 5-1)
(9) Release the lead wires from the P-HEX (Water-Water). (Refer to Procedure 7-6.)
(10) Release the lead wires from the clamp of the module box top. (Photo 11-3)
(11) Remove the 4 flexible pipes from the pipe of the unit assy (2 fasteners, 2 of G1" nuts, 2 of 1" gaskets, 2 O-rings). (Photo 11-4)
(12) Hold the nylon bands, and pull out the module unit assy. (Photo 11-5)

Notes:
1. Tightening torque of the G1" nuts: 42 ± 2 N▪m
2. Tighten the module box front in the order from screw A to L.

PHOTOS/ FIGURES

Photo 11-1

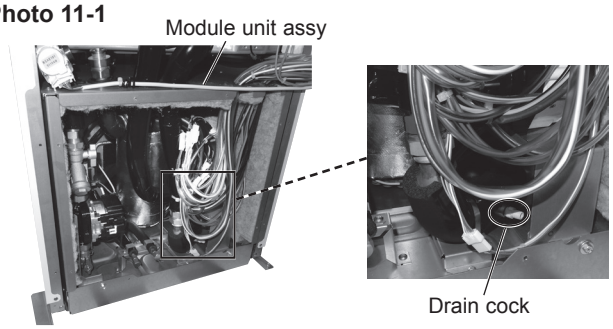


Photo 11-2

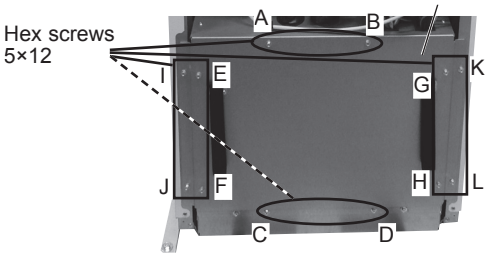


Photo 11-3

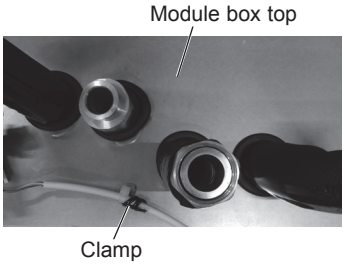


Photo 11-4

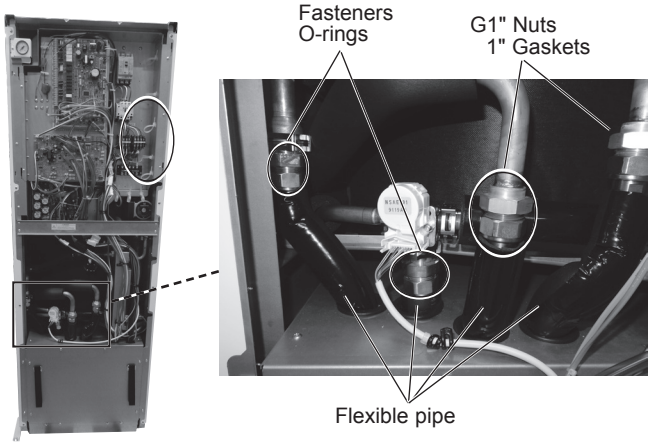
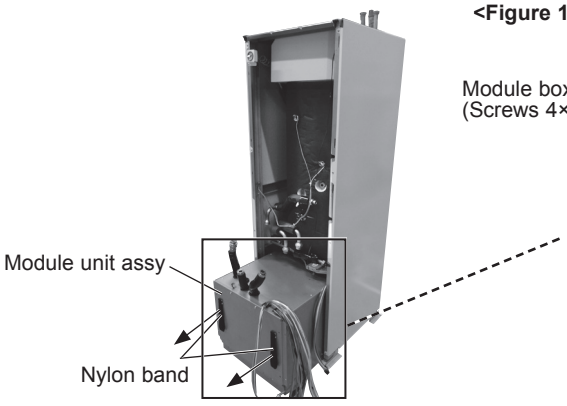
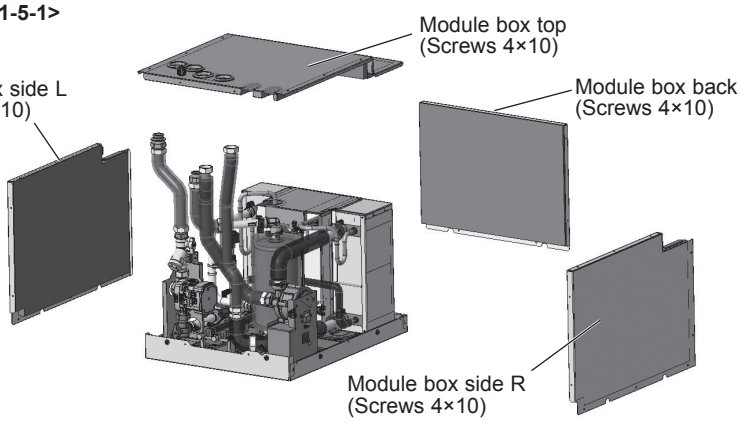
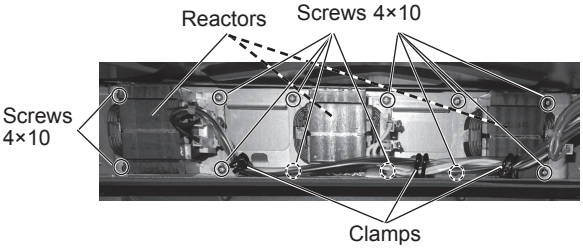
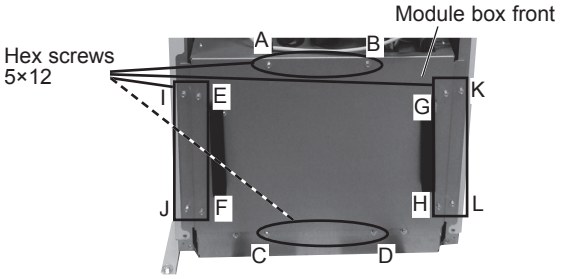
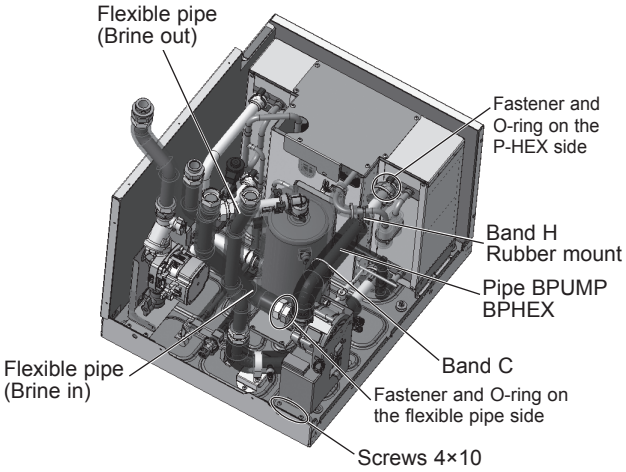
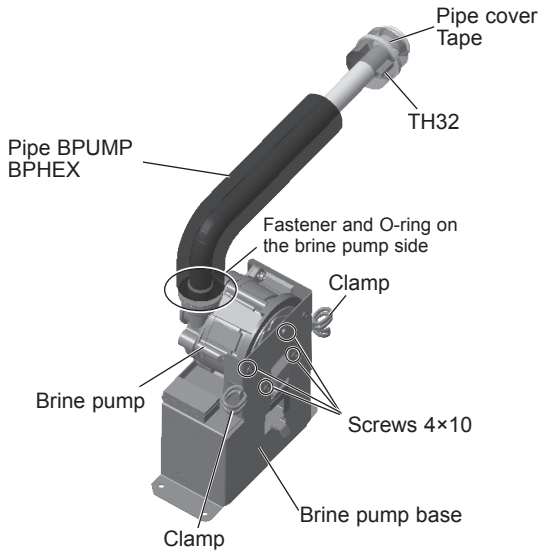


Photo 11-5



<Figure 11-5-1>



DISASSEMBLY PROCEDURE	PHOTOS/ FIGURES
12. How to remove the reactor (1) Pull out the module unit assy. (Refer to Procedure 11.) (2) Release the lead wires connected to the reactors from the clamps. (Photo 12) (3) Disconnect the lead wires from the 3 reactors. (Photo 12) (4) Remove the reactors from the unit (4 screws 4x10 on each reactor).	**Photo 12** 
13. How to remove the brine pump (1) Pull out the module unit assy. (Refer to Procedure 11.) (2) Remove the 8 Hex screws 5×12 from A to H of the module unit assy to remove the module unit front . (Photo 13-1). (3) Remove the module box top and the module box side R from the module unit assy (13 screws 4x10). (Figure 11-5-1) (4) Disconnect the relay connector of brine pump. (5) Remove the rubber mount, band C and band H. (Figure 13-1) (6) Remove the flexible pipe (brine in) from the brine pump (the fastener and the O-ring on the flexible pipe side). (Figure 13-1) (7) Remove the TH32 lead wire. (Figure 13-2) (If the pipe cover and the tape cannot be reused after removing TH32, obtain them locally.) (8) Release the lead wires from the clamps on the brine pump base. (Figure 13-2) (9) Remove the brine pump assy and the pipe BPUMP BPHEX together (the fastener and the O-ring on the P-HEX side, 2 screws 4x10). (10) Remove pipe BPUMP BPHEX from the brine pump. (The fastener and the O-ring on the brine pump side) (Figure 13-2) (11) Remove the brine pump from the brine pump base (4 screws 4x10). (Figure 13-2) Notes: 1. Use the Hex screws 5×12 to fix the module box front. Tighten the module box front in the order from screw A to L.	**Photo 13-1**  **Figure 13-1**  **Figure 13-2** 

DISASSEMBLY PROCEDURE

14. How to remove the water pump

(1) Pull out the module unit assy. (Refer to Procedure 11.)
(2) Remove the module box front. (Refer to Procedure 13-2.)
(3) Remove the module box top and the module box side L from the module unit assy (13 screws 4x10). (Figure 11-5-1)
(4) Disconnect the lead wire from the connector of the water pump. (Photo 14-1)
(5) Disconnect the lead wire of the flow sensor. (Photo 14-2)
(6) Remove the flexible pipe (H-STR) from the water pump (the G1"nut and the 1" gasket on the flexible pipe side). (Photo 14-2)
(7) Release the THW2 lead wire. (Photo 14-2)
(8) Remove the water pump assy (2 screws 4×10), the fastener and the O-ring at the P-HEX side). (Photo 14-2 and 14-3)
(9) Remove the pipes of the water pump from the water pump assy (the fastener and the O-ring at the pump side). (Photo 14-4)
(10) Remove the screws fixing the pump and the pump stay (2 screws 4×10 each at 2 positions). (Photo 14-4)
(11) Remove the upper and lower G1" nuts and the 1" gaskets at 2 positions from the water pump assy. (Photo 14-4)

Note:
Tightening torque of the G1" nuts: 42 ± 2 N▪m
Tightening torque of the flow sensor: 0.6 ± 0.2 N▪m.

*1 When replacing the pump only
- Remove the front panel. (Refer to Procedure 1.)
- Remove the module box front, then close the valves above and under the pump.
- Remove the G1" nuts and the 1" gaskets on and under the pump.

*2 When replacing the strainer only
- Remove the front panel. (Refer to Procedure 1.)
- Remove the module box front, then close the valve on and under the pump.
- Remove the strainer cover on the pump.

Notes:
- Tightening torque of the G1" nut: 42 ± 2 N▪m
- Tightening torque of the strainer cover: 40 ± 2 N▪m

PHOTOS/ FIGURES

Photo 14-1

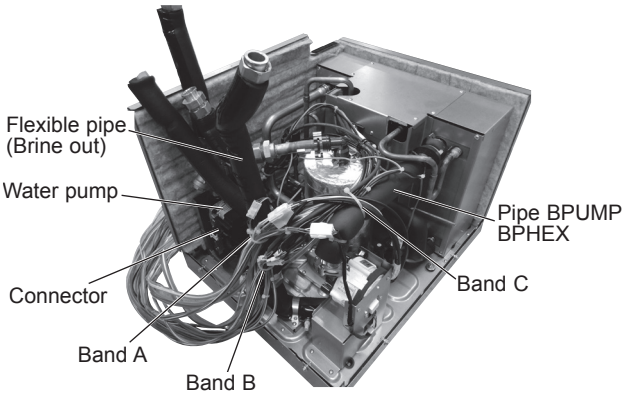


Photo 14-2

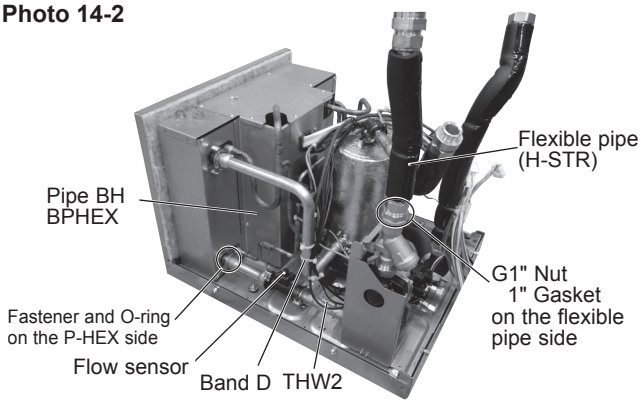


Photo 14-3

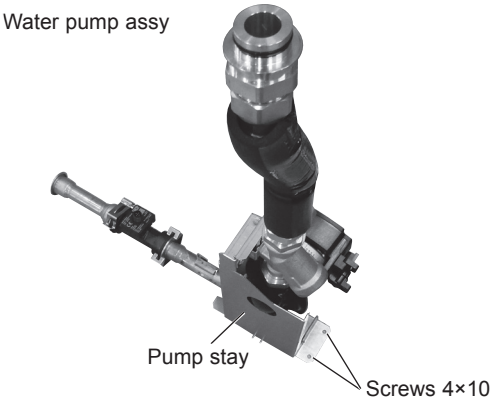
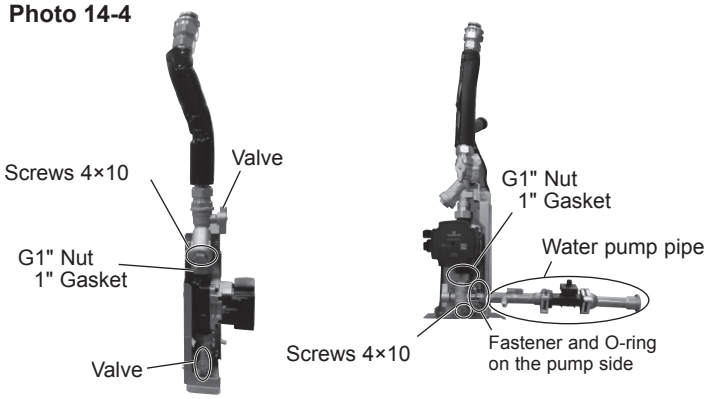
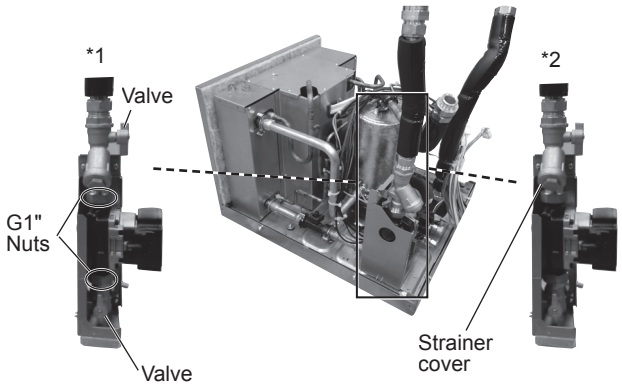
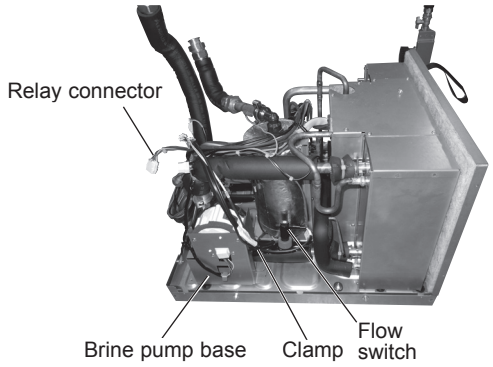
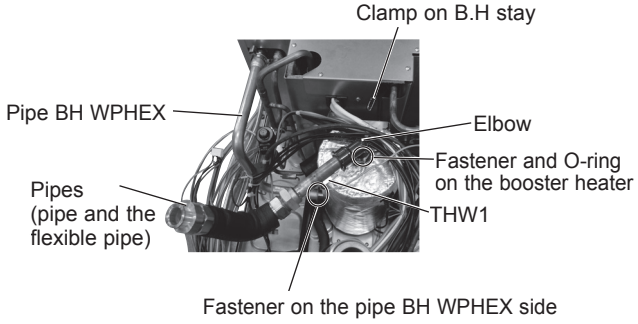
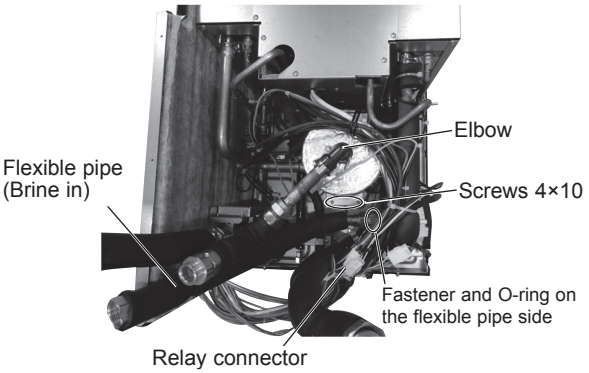


Photo 14-4





DISASSEMBLY PROCEDURE	PHOTOS/ FIGURES
15. How to remove the flow switch (1) Pull out the module unit assy. (Refer to Procedure 11.) (2) Remove the module box front. (Refer to Procedure 13-2.) (3) Remove the module box top and the module box side R. (Refer to Procedure 13-3.) (4) Disconnect the relay connector of the flow switch. (5) Remove the band C. (Photo 14-1) (6) Release the lead wires from the clamp on the brine pump base. (Photo 15) (7) Remove the flow switch. (Photo 15) Note: Tightening torque of the flow switch: 8 ± 1 N▪m	**Photo 15** 
16. How to remove the booster heater (1) Pull out the module unit assy. (Refer to Procedure 11.) (2) Remove the module box front. (Refer to Procedure 13-2.) (3) Remove the module box top and the module box side R. (Refer to Procedure 13-3.) (4) Remove the flexible pipe (brine in). (Refer to Procedure 13-6). (5) Remove the THW1 lead wire. (Photo 16-1) (6) Release the lead wires from the clamp on B.H stay. (Photo 16-1) (7) Disconnect the relay connector of the booster heater. (8) Remove the band C. (Photo 14-1) (9) Remove the pipes (pipe and the flexible pipe) connected with an elbow from the booster heater (the fastener and the O-ring). (Photo 16-1) (10) Remove the fastener and the O-ring on the pipe BH WPHEX side from the booster heater. (Photo 16-1) (11) Remove the booster heater assy (2 screws 4×10). (Photo 16-2) (12) Remove the booster heater from the B.H stay (3 screws 4×8). (Photo 16-3)	**Photo 16-1**  **Photo 16-2**  **Photo 16-3** 

DISASSEMBLY PROCEDURE

17. How to remove the LEV

(1) Pull out the module unit assy. (Refer to Procedure 11.)
(2) Remove the module box front. (Refer to Procedure 13-2.)
(3) Remove the module box top, the module box side L, and the module box side R from the module unit assy (18 screws 4×10). (Figure11-5-1)
(4) Disconnect the relay connector of LEV.
(5) Remove the brine pump. (Refer to Procedure 13.)
(6) Remove the water pump. (Refer to Procedure 14.)
(7) Remove the booster heater. (Refer to Procedure 16.)
(8) Recover refrigerant from the charge port. (Photo 17-1)
(9) Remove the band D fixing TH2 and TH33 lead wires. (Photo 17-2 and 17-3)
(10) Remove the rubber cushion and the band. (Photo 17-3)
(11) Remove the tape and the pipe cover from the LEV piping (Photo 17-3). (If the pipe cover and the tape cannot be reused, obtain them locally.)
(12) Detach the 2 brazing portions of the LEV from P-HEX. (Photo 17-3)

Note:
The temperature of the LEV must be 95°C or under when brazing.

PHOTOS/ FIGURES

Photo 17-1

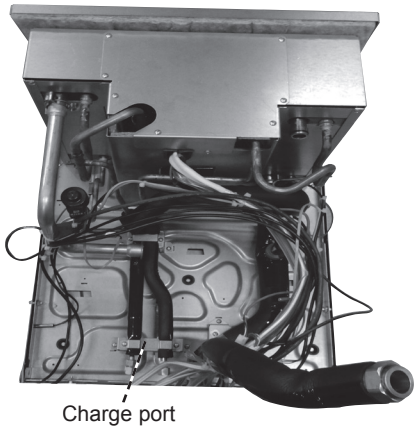


Photo 17-2

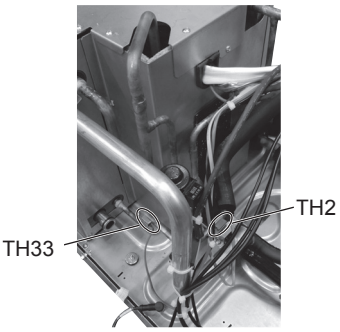
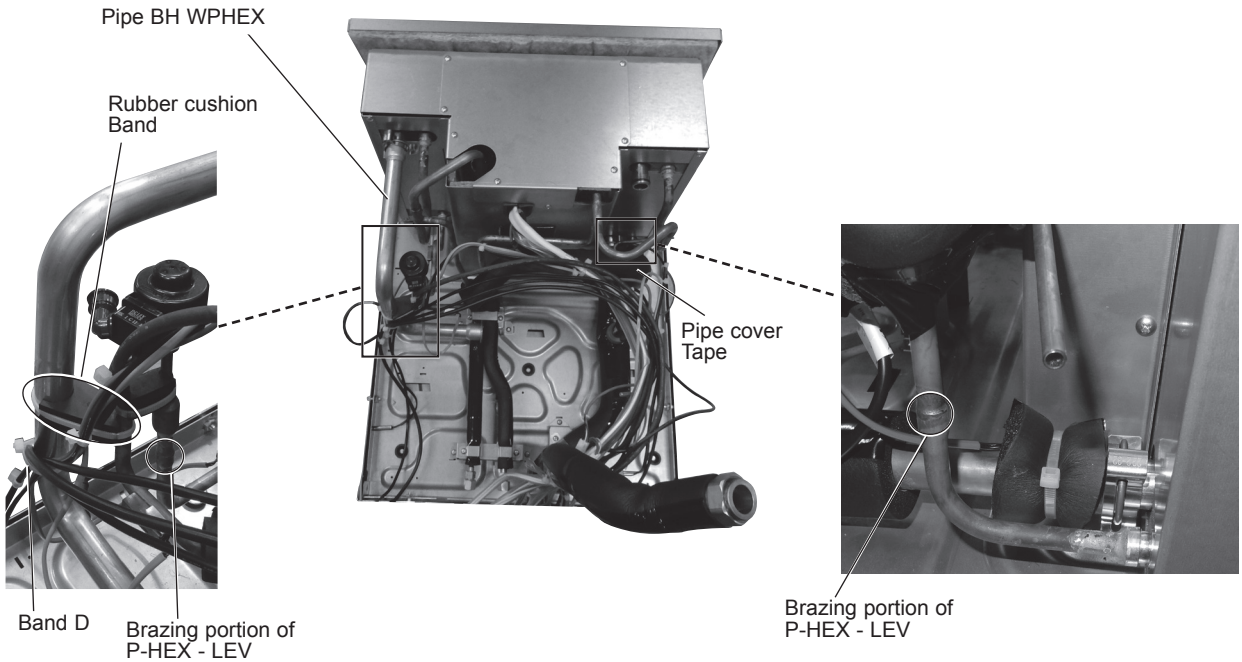


Photo 17-3



DISASSEMBLY PROCEDURE

18. How to remove the H.P. switch, the H.P. sensor, and the muffler

(1) Pull out the module unit assy. (Refer to Procedure 11.)
(2) Remove the module box front. (Refer to Procedure 13-2.)
(3) Remove the module box top, the module box side L, the module box side R, and the module box back from the module unit assy (20 screws 4×10). (Figure 11-5-1)
(4) Remove the booster heater. (Refer to Procedure 16.)
(5) Remove the COMP case top (8 screws 4×10). (Photo 18-1)
(6) Disconnect the relay connector when removing the H.P. sensor or H.P. switch.
(7) Recover refrigerant. (Refer to Procedure 17-8.)
(8) Remove the band E bundling the lead wires in the COMP case, and divide the lead wires for each replacement part. (Photo 18-1)
(9) Remove the nut, the washer, and the terminal cover from the compressor. (Photo 18-2)
(10) Disconnect the lead wire (TH33, TH4, H.P. switch, and the COMP wire in the terminal cover) from the compressor. (Photo 18-2)
(11) Remove the INS (SUC MUF) from the compressor. (Photo 18-2) (If the INS (SUC MUF) cannot be reused, obtain it locally.)
(12) Detach the brazing portions connecting the compressor and the discharge pipe, and P-HEX and the discharge pipe. (Photo 18-2)
(13) Remove the 4 bands and the 3 rubber cushions from the pipe. (Photo 18-3)
(14) Detach the brazing portion of a part to be replaced (H.P. switch/ H.P. sensor/ muffler). (Photo 18-3)

Note:
- The temperature of H.P. switch must be 100°C or under when brazing.
- The temperature of H.P. sensor must be 100°C or under when brazing.
- Use screws 4×10 to fix the COMP case top.

PHOTOS/ FIGURES

Photo 18-1

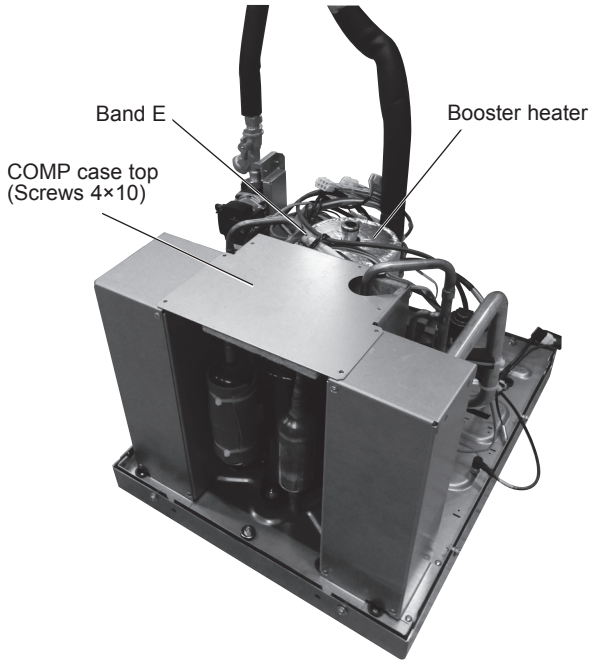


Photo 18-2

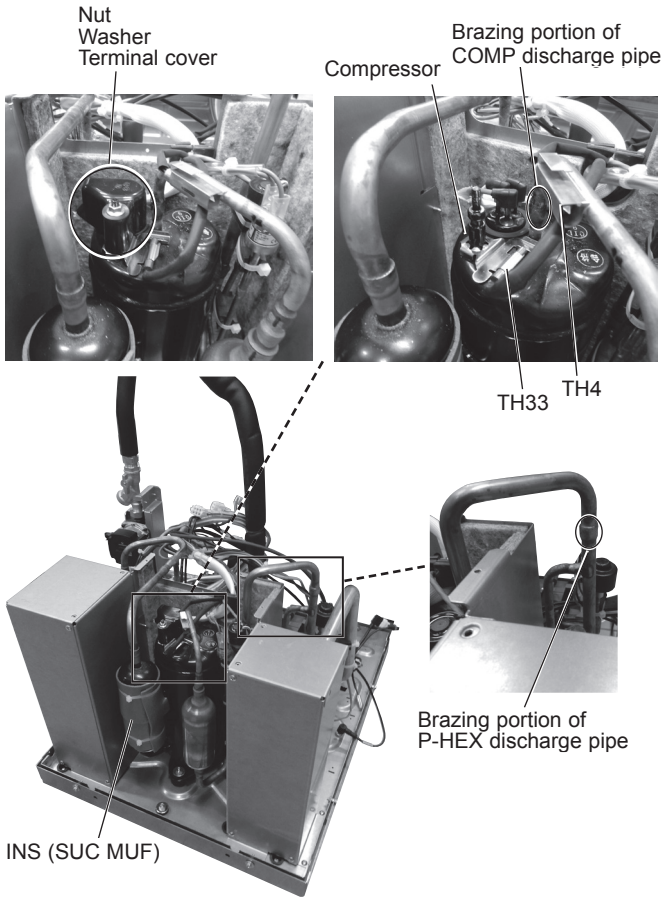
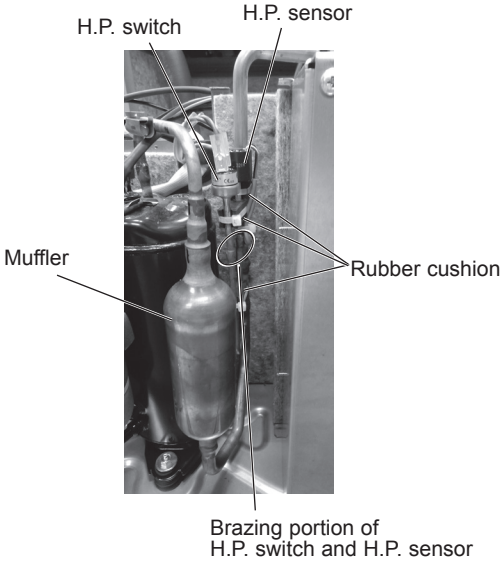


Photo 18-3

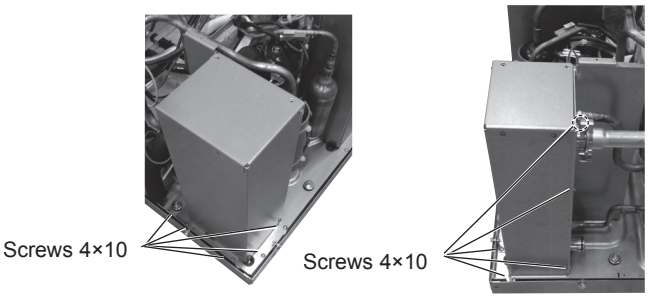


DISASSEMBLY PROCEDURE

19. How to remove the P-HEX.

(1) Pull out the module unit assy. (Refer to Procedure 11.)
(2) Remove the module box front. (Refer to Procedure 13-2.)
(3) Remove the module box top, the module box side L, the module box side R, and the module box back from the module unit assy. (Refer to Procedure 18-3.)
(4) Remove the TH34 lead wire. (Photo 19-1)
(If the pipe cover and the tape cannot be reused due to removing the TH34 lead wire, obtain them locally.)
(5) Remove the booster heater. (Refer to Procedure 16.)
(6) Remove the COMP case top. (Refer to Procedure 18-5.)
(7) Remove the brine pump. (Refer to Procedure 13.)
(8) Remove the rubber cushion and the band. (Refer to Procedure 17-10.)
(9) Remove the FS pipe band from the FS pipe stay (2 screws 4×10). (Photo 19-1)
(10) Remove the pipe BH-WPHEX and pipe BPHEX-FSWI from the P-HEX (2 fasteners and 2 O-rings).(Photo 19-1)
(11) Recover refrigerant. (Refer to Procedure 17-8.)
(12) Remove the tape and the pipe cover. (Refer to Procedure 17-11.)
(13) Detach the 5 brazing portions of refrigerant pipes. (Photo 19-2)
(14) Remove the P-HEX (6 screws 4×10, 6 positions on one side). (Photo 19-3)

Photo 19-3



20. How to remove the compressor

(1) Pull out the module unit assy. (Refer to Procedure 11.)
(2) Remove the module box front. (Refer to Procedure 13-2.)
(3) Remove the module box top, module box side L, module box side R, and module box back. (Refer to Procedure 18-3.)
(4) Remove the booster heater. (Refer to Procedure 16.)
(5) Remove the COMP case top. (Refer to Procedure 18-5.)
(6) Recover refrigerant. (Refer to Procedure 17-8.)
(7) Remove the band E. (Refer to Procedure 18-8.)
(8) Remove the nut, the washer, and the terminal cover. (Refer to Procedure 18-9.)
(9) Disconnect the lead wires (TH33, TH4, H.P. switch, and COMP wire). (Refer to Procedure 18-10.)
(10) Remove the INS (SUC MUF). (Refer to Procedure 18-11.)
(11) Detach 5 brazing portions of the refrigerant pipes (suction and discharge). (Photo 20-1)
(12) Remove the pipe BHEX-C DWG and pipe C-WPHEX assy from the pipe. (Photo 20-1)
(13) Remove the compressor (3 nut specials). (Photo 20-2)
Note: Tightening torque of the nut specials: 4 ± 0.4 N▪m

PHOTOS/ FIGURES

Photo 19-1

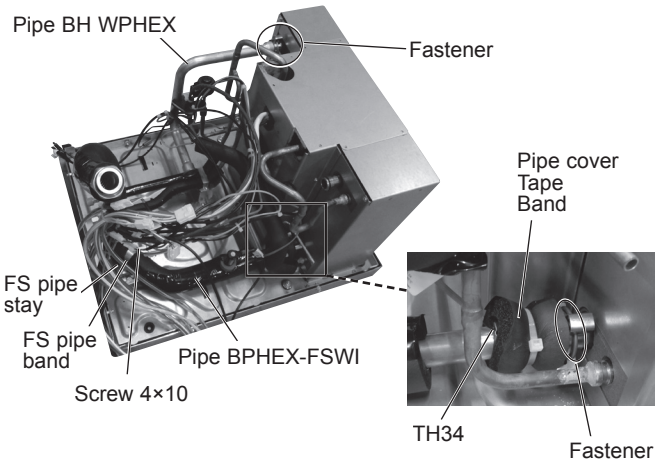


Photo 19-2

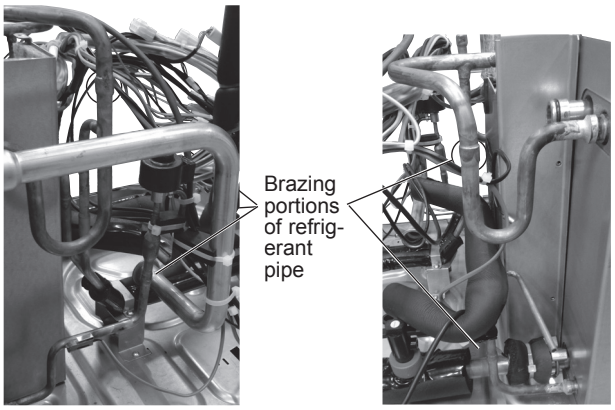


Photo 20-1

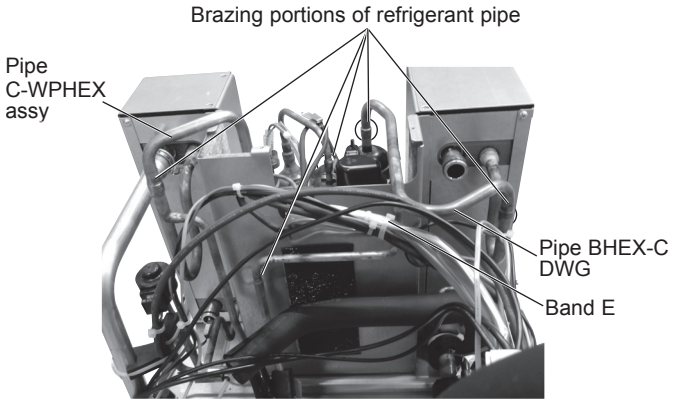
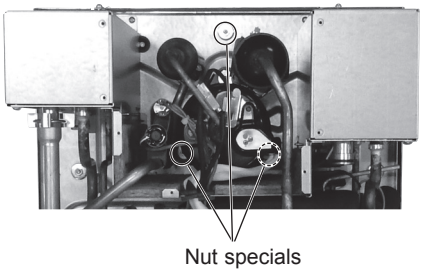
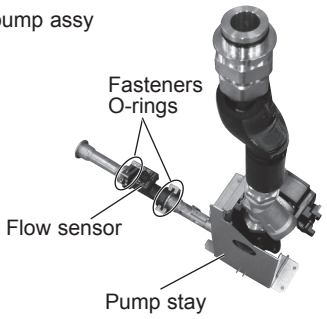
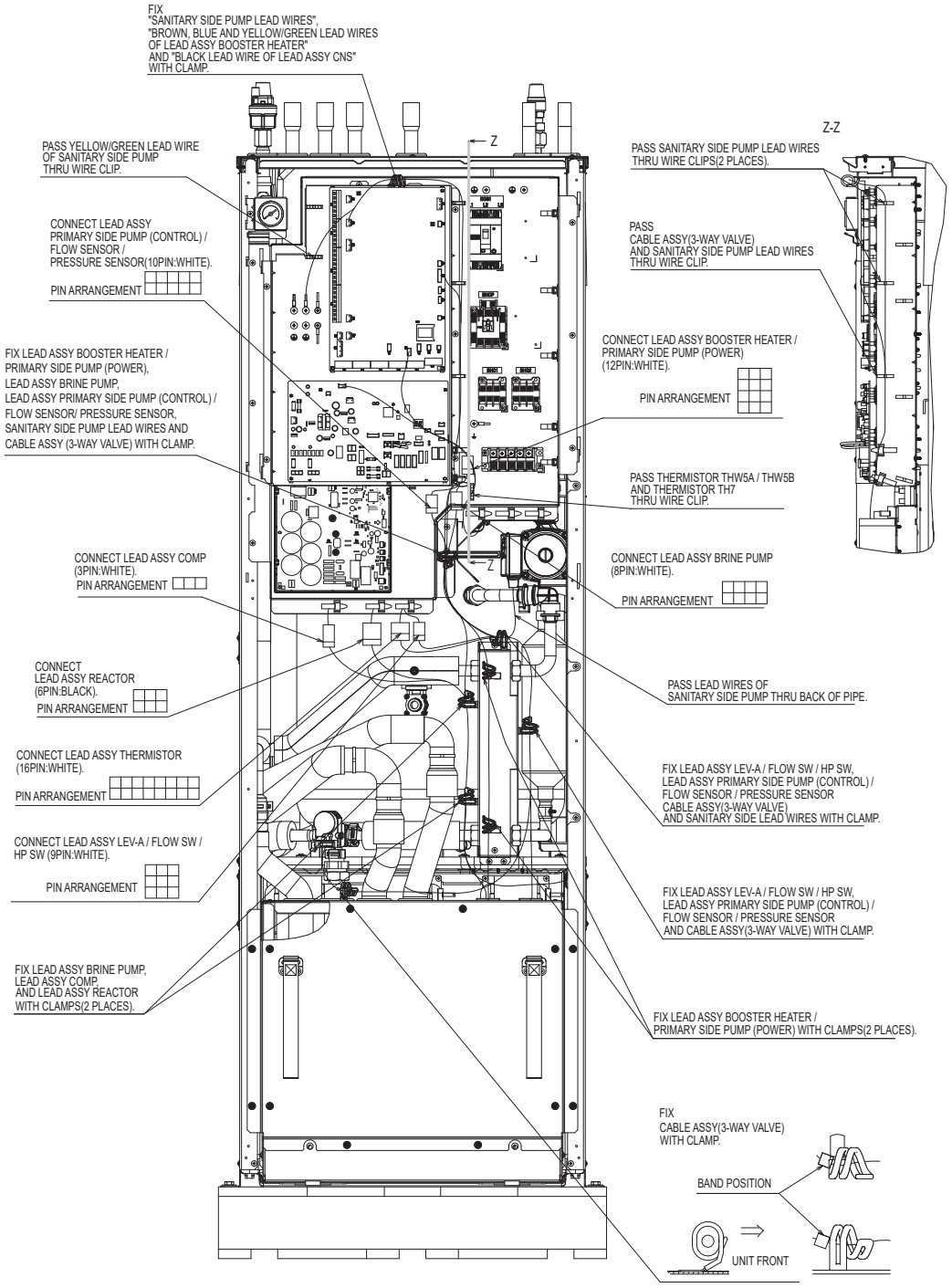


Photo 20-2



DISASSEMBLY PROCEDURE	PHOTOS/ FIGURES
21. How to remove the flow sensor (1) Remove the water pump assy. (Refer to Procedure 14.) (2) Remove the flow sensor (the 2 fasteners and the 2 O-rings in front and back of the flow sensor). (Photo 21)	**Photo 21** 

<Details of lead wire routing/ fixing and the connection to the connector>



Notes on replacing the parts

Replacement of the parts listed below requires the following procedure.
After the parts are removed, eliminate loctite on threads by applying loctite remover, apply new loctite, and then install and tighten the parts to the specified tightening torques below. For details about recommended loctite and loctite remover, refer to Table 10-1, and for details about the replacement parts and their tightening torques, refer to Table 10-2.

Table 10-1

Recommended	Manufacturer	No.	Applied parts	Note
Loctite	Henkel	Loctite 5400	PRESSURE RELIEF VALVE (3bar and 10bar)	Apply loctite all over from the end of external thread to the second ridge. After installing the parts, fix the parts for at least 30 minutes
		Loctite 5776	TEMPERATURE AND PRESSURE RELIEF VALVE	
Loctite remover	Henkel	Loctite 7200 Gasket Remover	PRESSURE RELIEF VALVE (3bar and 10bar) and TEMPERATURE AND PRESSURE RELIEF VALVE	Spray loctite remover over sealant on the threads, let the sealant sit until soft, and then eliminate it with a wire brush.

Note: When using the products above, refer to the appropriate manuals that come with the individual products.

Table 10-2

Part name *1	Recommended tightening torque [Nm] *2
PRESSURE RELIEF VALVE 3 bar	35 ± 2
PRESSURE RELIEF VALVE 10 bar	40 ± 2

*1. For more details about the listed parts refer to the parts catalog.
*2. Undertightening and overtightening the parts affect water seal life. Tighten the parts to the appropriate tightening torques.

When installing the parts that are not listed above, observe the tightening torques in accordance with Table 10–3.
Always use a new O–ring or gasket.

Table 10-3

Size [inch]		Recommended tightening torque [Nm]
Gasket	G1/4"	8 ± 1
	G3/8"	35 ± 2
	G3/4"	42 ± 2
	G1"	42 ± 2
	G1 3/4"	10 ± 1
Packing	Strainer cover	40 ± 2
O-ring	Flow sensor	0.6 ± 0.2
	Air vent (Automatic)	35 ± 1
	Flow switch (Brine circuit)	8 ± 1
Attached packing	Drain cock (primary / brine circuit)	0.25 ± 0.05
	Air vent (manual)	0.25 ± 0.05
Flare joint (for water circuit parts)		35 ± 2

After the procedure is complete, ensure that no water leaks.

11 SUPPLEMENTARY INFORMATION

■ Back-up operation of boiler

Heating operation is backed up by boiler.
For more details, refer to the installation manual of PAC-TH012HT-E.

<Installation & System set up>

1. Set DIP-SW 1-1 (FTC) to ON "With boiler" and SW2-6 (FTC) to ON “With Mixing tank”.
2. Install the thermistors THWB1*1 on the boiler circuit.
3. Connect the output wire (OUT10: Boiler operation) to the input (room thermostat input) on the boiler. *2
4. Install one of the following room temperature thermostats. *3

- Wireless remote controller (option)
- Room temp. thermostat (local supply)
- Main remote controller (remote position)

*1 The boiler temperature thermistor is an optional part.
*2 OUT10 has no voltage across it.
*3 Boiler heating is controlled on/off by the Room temp. thermostat.

<Main remote controller settings>

1. Go to Service menu > Heat source setting and choose “Boiler” or “Hybrid”. *4
2. Go to Service menu > Operation settings > Boiler settings to make detailed settings for “Hybrid” above .

*4 The “Hybrid” automatically switches heat sources between Heat pump (and Electric heater) and boiler.

■ Product fiche of temperature control

(a) Supplier's name: MITSUBISHI ELECTRIC CORPORATION
(b) Supplier's model identifier: PAR-WT50R-E and PAR-WR51R-E
(c) The class of the temperature control: VI
(d) The contribution of the temperature control to seasonal space heating energy efficiency: 4%

Engineers Forms

Commissioning/Field settings record sheet (continued from the previous page)

Main remote controller screen					Parameters			Default setting	Field setting	Notes
Setting	Service menu	Thermistor adjustment		THW1	−10°C to +10°C			0°C		
				THW2	−10°C to +10°C			0°C		
				THW5A	−10°C to +10°C			0°C		
				THW5B	−10°C to +10°C			0°C		
				THW6	−10°C to +10°C			0°C		
				THW7	−10°C to +10°C			0°C		
				THW8	−10°C to +10°C			0°C		
				THW9	−10°C to +10°C			0°C		
				THW10	−10°C to +10°C			0°C		
				THWB1	−10°C to +10°C			0°C		
		Auxiliary settings		Economy settings for pump.	On/Off *2			On		
					Delay (3 to 60 min)			10 min		
				Electric heater (Heating)	Space heating: On (used)/Off (not used)			On		
					Electric heater delay timer (5 to 180 min)			30 min		
				Electric heater (DHW)	Booster heater	DHW: On (used)/Off (not used)		On		
					Immersion heater	DHW: On (used)/Off (not used)		On		
					Electric heater delay timer (15 to 30 min)			15 min		
				Mixing valve control	Running (10 to 240 sec)			120 sec		
					Interval (1 to 30 min)			2 min		
				Flow sensor *10	Minimum (0 to 100L/min)			5 L/min		
					Maximum (0 to 100L/min)			100 L/min		
				Analog output	Interval (1 to 30 min)			5 min		
					Priority (Normal/High)			Normal		
		Pump speed		DHW	Pump speed (1 to 5)			5		
				Heating	Pump speed (1 to 5)			5		
		Heat source setting			Standard/Heater/Boiler/Hybrid *3			Standard		
		Heat pump settings		Heat pump flow rate range	Minimum (0 to 100L/min)			5 L/min		
					Maximum (0 to 100L/min)			100 L/min		
				Quiet mode	Day (Mon to Sun)			—		
					Time			0:00-23:45		
					Quiet level (Normal/Level1/Level2)			Normal		
		Operation settings	Heating operation *4	Flow temp.range *6	Minimum.temp. (20 to 45°C)			30°C		
					Maximum.temp. (35 to 60°C)			50°C		
				Room temp. control *9	Mode (Normal/Fast)			Normal		
					Interval(10 to 60min)			10min		
				Heat pump thermo diff.adjust	On/Off *2			On		
					Lower limit (−9 to −1°C)			-5°C		
					Upper limit (+3 to +5°C)			5°C		
			Freeze stat function *7		Outdoor ambient temp. (3 to 20°C) / **			5°C		
			Simultaneous operation (DHW/ Heating)		On/Off *2			Off		
					Outdoor ambient temp. (−30 to +10°C)			−15°C		
			Cold weather function		On/Off *2			Off		
					Outdoor ambient temp. (−30 to −10°C)			−15°C		
			Boiler operation		Hybrid settings	Outdoor ambient temp. (−30 to +10°C)		−15°C		
						Priority mode (Ambient/Cost/CO_2)		Ambient		
					Intelligent set-tings	Energy price *5	Electricity (0.001 to 999 */kWh)	0.5 */kWh		
							Boiler (0.001 to 999 */kWh)	0.5 */kWh		
						CO_2 emission	Electricity (0.001 to 999 kg -CO2/kWh)	0.5 kg -CO2/kWh		
							Boiler (0.001 to 999 kg -CO2/kWh)	0.5 kg -CO2/kWh		
						Heat source	Heat pump capacity (1 to 40 kW)	11.2 kW		
							Boiler efficiency (25 to 150%)	80%		
							Booster heater 1 capacity (0 to 30 kW)	2 kW		
							Booster heater 2 capacity (0 to 30 kW)	4 kW		

(Continued to next page.)

(From the previous page.)

Engineers Forms

Commissioning/Field settings record sheet (continued from the previous page)

Main remote controller screen							Parameters	Default setting	Field setting	Notes
Setting	Service menu	Operation settings	Smart grid ready	DHW	On/Off			Off		
					Target temp (+1 to +20°C) / -- (Non active)			--		
				Heating	On/Off			Off		
					Target temp.	Switch-on recommendation (20 to 60°C)		50°C		
						Switch-on command (20 to 60°C)		55°C		
				Pump cycles	Heating (On/Off)			On		
					Interval (10 to 120 min)			10 min		
			Floor dry up function		On/Off *2			Off		
					Target temp.	Start&Finish (20 to 60°C)		30°C		
						Max. temp. (20 to 60°C)		45°C		
						Max. temp. period (1 to 20 days)		5 days		
					Flow temp. (Increase)	Temp. increase step (+1 to +10°C)		+5°C		
						Increase interval (1 to 7 days)		2 days		
					Flow temp. (Decrease)	Temp. decrease step (−1 to −10°C)		−5°C		
						Decrease interval (1 to 7 days)		2 days		
			Summer mode		On/Off			Off		
					Outdoor ambient temp.	Heating ON (4 to 19°C)		10°C		
						Heating OFF (5 to 20°C)		15°C		
					Judgement time	Heating ON (1 to 48 hours)		6 hours		
						Heating OFF (1 to 48 hours)		6 hours		
					Forced heating ON (−30 to 10°C)			5 °C		
			Water flow control		On/Off			Off		
		Energy monitor settings		Electric heater capacity	Booster heater 1 capacity		0 to 30kW	2kW		
					Booster heater 2 capacity		0 to 30kW	4kW		
					Immersion heater capacity		0 to 30kW	0kW		
					Analog output		0 to 30kW	0kW		
				Delivered energy adjustment			−50 to +50%	0%		
				Water pump input	Pump 1		0 to 200W or ***(factory fitted pump)	***		
					Pump 2		0 to 200W	0W		
					Pump 3		0 to 200W	0W		
					Pump 4		0 to 200W	72W		
				Electric energy meter			0.1/1/10/100/1000 pulse/kWh	1 pulse/kWh		
				Heat meter			0.1/1/10/100/1000 pulse/kWh	1 pulse/kWh		
		External input settings		Demand control (IN4)			Heat source OFF/Boiler operation	Boiler operation		
				Outdoor thermostat (IN5)			Heater operation/Boiler operation	Boiler operation		
		Thermo ON output					Zone1/Zone2/Zone1&2	Zone1&2		

*1 The settings related to Zone2 can be switched only when 2 zone temperature control is enabled (when DIP SW2-6 and SW 2-7 (FTC) are ON).
*2 On: the function is active; Off: the function is inactive.
*3 When DIP SW1-1 (FTC) is set to OFF “WITHOUT Boiler” or SW2-6 (FTC) is set to OFF “WITHOUT Mixing tank”, neither Boiler nor Hybrid can be selected.
*4 Valid only when operating in Room temp. control mode.
5 “” of “*/kWh” represents currency unit (e.g. € or £ or the like)
*6 Valid only when operating in Heating room temperature.
*7 If asterisk (**) is chosen freeze stat function is deactivated. (i.e. primary water freeze risk)
*8 The settings related to Zone2 can be switched only when 2-zone temperature control or 2-Zone valve ON/OFF control is active.
*9 When DIP SW5-2 (FTC) is set to OFF, the function is active.
*10 Do not change the setting since it is set according to the specification of flow sensor attached to the heat pump unit.

Annual Maintenance Log Book

Contractor name		Engineer name	
Site name		Site number	

Cylinder unit maintenance record sheet			
Warranty number		Model number	
		Serial number	

No.	Mechanical	Frequency	Notes
1	Turn OFF water supply, drain DHW tank, remove mesh from strainer clean and replace in strainer. *1		
2	Keep water supply OFF, open hot water taps and check the primary-side expansion vessel charge pressure. Top up if necessary (1 bar).		
3	Keep water supply OFF and check the potable vessel charge pressure. Top up if necessary (3.5 bar).		
4	Keep water supply OFF. In hard water areas de-scaling of the immersion heaters may be required.		
5	Drop the primary/heating system pressure to zero check and if necessary top up the expansion vessel (1 bar). Air valve of expansion vessel is TR-412.		
6	Turn water supply ON, open the pressure relief valve and then the expansion relief valve in turn. Check for unrestricted discharge to the tundish and that the valves reseat correctly. Check there are no blockages in the tundish and associated pipework.		
7	Check and if necessary top up the concentration of anti-freeze/inhibitor (if used in the system).		
8	Top up the primary/heating system using a temporary backflow prevention filling loop and re-pressurise to 1 bar.		
9	Heat system and check pressure does not rise above 3 bar and no water is released from the safety valves.		
10	Release any air from the system.		
11	To check the 3-way valve for inside leaks, confirm that the temperature of the heat emitter does not rise when running the DHW mode.		
	Electrical	Frequency	Notes
1	Check condition of cables.		
2	Check rating and fuse fitted on the electricity supply.		
	Controller	Frequency	Notes
1	Check field settings against factory recommendations.		
2	Check operation of motorized valves ensure they reseat correctly.		
3	Check battery power of wireless thermostat and replace if necessary.		

Heat pump unit maintenance record sheet			
Model number		Serial number	

	Mechanical	Frequency	Notes
1	Inspect grill and air inlet for trapped debris/damage.		
2	Check condensate drain provision.		
3	Check integrity of water pipework and insulation.		
4	Check all electrical connections.		
5	Check and record the operation voltage.		

* Checks should be carried out once a year.
*1 Be sure to reattach the mesh after washing.

Note: Within the first couple of months of installation, remove and clean the cylinder unit's strainer mesh plus any that are fitted external to the cylinder unit. This is especially important when installing on an existing system.

In addition to annual servicing, it is necessary to replace or inspect some parts after a certain period of system operation. Please see tables below for detailed instructions. Replacement and inspection of parts should always be done by a competent person with relevant training and qualifications.

Parts which require regular replacement

Parts	Replace every	Possible failures
Pressure relief valve (PRV) Manometer	6 years	Water leakage

Parts which require regular inspection

Parts	Check every	Possible failures
Pressure relief valve (3 bar)	1 year (turning the knob manually)	PRV would be fixed and expansion vessel would burst
Immersion heater (Optional part)	2 years	Earth leakage causing circuit breaker to activate (Heater is always OFF)
Water circulation pump (Primary circuit)	20,000 hrs (3 years)	Water circulation pump failure
Brine circulation pump	30,000 hrs (4.5 years)	Brine circulation pump failure

Parts which must NOT be reused when servicing

* O-ring
* Gasket

Note:

- **Always replace the gasket for pump with a new one at each regular maintenance (every 20,000 hours of use or every 3 years).**

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